

German Combat Estimate 1943 + ~~1942~~ 1942

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GERMAN COMBAT ESTIMATE

January 1, 1943 ³

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January 1, 1943

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I. SYSTEM OF NATIONAL DEFENSE.

1. Coordination of National Defense. a. Armed Forces. The Armed Forces (Wehrmacht) of the nation consist of the Army (Heer), Navy (Kriegsmarine), and Air Force (Luftwaffe), each with its Commander and General Staff. The outstanding characteristic of German military operations in the present war has been the remarkable coordination of these three sister services, Army, Navy, and Air Force, into a unified command for definite tasks. The operations of elements of these services participating in a campaign are coordinated by the campaign commander who is designated by the High Command of the Armed Forces (Oberkommando der Wehrmacht).

b. High Command. Hitler is the Supreme Commander of the Armed Forces. Under him, the three services are coordinated by the High Command of the Armed Forces, which is responsible for all inter-service matters, the general planning of defense measures in time of peace, and the general conduct of war. The Chief of the High Command (Keitel) sits in the Cabinet and otherwise represents the armed forces in governmental and political councils. The High Command of the Armed Forces includes the Armed Forces Operations Staff, which advises Hitler on strategy and planning and serves as the equivalent of a joint general staff, the Industrial Mobilization Bureau, and the Counter-Espionage Service.

c. Service Organization. Each of the three armed services has its own high command (Army High Command, Navy High Command, Air Force High Command), and its own general staff. These are headed by the Commander-in-Chief of the Army, the Commander-in-Chief of the Navy, and the Commander-in-Chief of the Air Force, and are responsible for all purely military, naval, and air force matters, respectively. The Berlin headquarters of these high commands correspond roughly to our War and Navy Departments, but in time of war the Commander-in-Chief and much of the staff of each service move to advanced headquarters in the field for the conduct of operations.

d. Other Military and Semimilitary Forces. Important auxiliary functions are performed by various uniformed and more or less militarized organizations of the Nazi Party which are not directly under the Armed Forces but operate in close cooperation with them. The only combat organization of this category is the Waffen-SS or combat branch of the Nazi Elite Guard (Schutzstaffeln). Duties connected with supply, training, construction, communications, and policing are performed by the General SS, the SA (storm troops), the Labor Service, the Todt Organization, the Nazi Motor Corps, the Nazi Flying Corps, the Technical Emergency Corps, and the Security Police. Not counting the SS, the SA, or the police, these auxiliary organizations are estimated to total approximately 1,500,000 men. The total police force of all categories is believed to be less than 1,000,000.

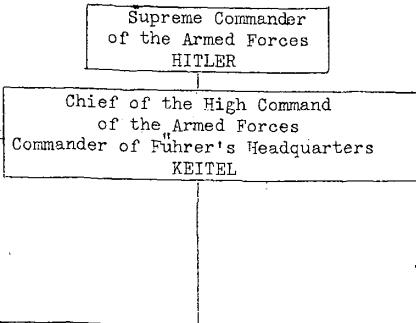
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OKW
Combined Headquarters of the Armed Forces controls all matters pertaining to inter-service policy and directs the conduct of the war, including strategic planning. Coordinates production, supply, and man power. Hence it is responsible for the direction and control of the war effort.

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ORGANIZATION OF GERMAN HIGH COMMAND



Ersatz Heer
(Replacement Army) Director-General of Equipment and Commander of the Training Army.
FRÖLM

Chief of Staff
ZEITZLER

The OKH gives advice on the Army aspects of the joint plans, and works out plans for operations assigned to the Army.

Responsible for the supply of equipment and trained recruits to the field armies.
Troops in rest areas.
Troops undergoing reorganization.
Troops enroute to field armies.

Chief of Armed Forces Operations Staff JODL
Joint Planning WARLICHOFT
Joint Intelligence CANARIS*
Communiques
Public Relations
Military Propaganda

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* CANARIS may operate directly under HITLER and not under or through KEITEL.

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Estimated strengths of the above (except SS and SA) are:

National Socialist Motor Corps	250,000
Labor Service	500,000
National Socialist Flying Corps	100,000
Technical Emergency Corps	150,000
Todt Organization	450,000
TOTAL	1,450,000

II. ARMY.

2. Personnel. a. Estimate of Strength of Components. (278 Combat divisions not including GHQ, Army, and Corps Troops).

The strength and composition of the German Army changes not only from year to year but also during the course of the year. The latest estimates should be obtained from the current Order of Battle Estimate which is published weekly.

In order to give a general idea of the strength and composition of the German Army, herewith is a summary as of January 1, 1943:

<u>TYPE</u>	<u>NUMBER IDENTIFIED</u>	<u>NUMBER ESTIMATED IN EXISTENCE</u>		
		<u>Offensive</u>	<u>Defensive</u>	<u>Administrative</u>
Panzer Divisions	27	27		
Motorized Infantry	11	12		
Light (Jäger) Divisions	8	8		
SS Divisions	8	10		
Mountain Divisions	7	8		
<u>Infantry</u>				
Infantry Divisions (Offensive Type)	148	149		
Infantry Divisions (Defensive Type)	15		15	
Line of Communications (Sicherungs Divisionen)	12		12	
Administrative Divisions	31			31
Replacement Training Divisions	33		15	18
Coastal Division Commands	3		7	
Equivalent (Potential) Divisions		10		
Frontier Guard Divisions	5		5	
TOTALS	308	224	54	49

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Offensive divisions are divisions which, from the German standpoint, are capable of taking an active part in offensive mobile operations on the front in the spearhead of an attack.

Defensive divisions as such are not suitable for mobile operations on the front, but may be converted to offensive divisions by the addition of suitable GHQ units and transportation. They are however suitable in a defensive role, especially when holding fixed positions, and for duty as occupation units.

Administrative divisions normally consist of division staffs only. Administrative divisions usually have a territorial assignment. Combat units may be attached to administrative divisions for administrative purposes when they are located in division areas. These divisions can be converted into a defensive type division by attaching the requisite number of combat units from GHQ reserve.

From the above tabulation, it can be seen that Germany had, as of January 1, 1943, an estimated 278 combat divisions; 234 offensive and 54 defensive. Administrative divisions are noncombatant types.

To convert the division strength to actual strength, a factor of 30,000 per division is used to determine the strength in a theater of operations (division plus Corps, Army and GHQ troops) and 27,000 to determine the overall strength of the Army.

Thus, the combat echelon strength of the German Army is:

$$278 \times 20,000 \quad \text{or} \quad 5,560,000 \text{ men}$$

while the total strength is:

$$278 \times 27,000 \quad \text{or} \quad 7,566,000 \text{ men}$$

b. Additional Manpower. The total manpower of Greater Germany available for military service is between 12,500,000 and 13,000,000 men. Of this total about 9,300,000 are under arms including army, navy, and air corps. It is estimated that a yearly increment of around 350,000 - 400,000 men physically fit for military service is available.

3. Organization.

a. Commander in Chief. At the head of the High Command of the Army (Oberkommando des Heeres) is an army officer who is designated as Commander in Chief of the army (Der Oberbefehlshaber des Heeres) by Reichsfuehrer Hitler. (This function for the present has been assumed by Herr Hitler). The Commander in Chief is the actual head of the Army without occupying the

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status of a cabinet member. He commands the Army in time of peace and is the field commander in time of war.

b. The High Command of the Army.

(1) Organization. The High Command of the Army is organized into eight main sections:

The General Staff (Generalstab)
The Adjutant's Office (adjutantur)
The Personnel Office (Personalamt)
General Army Office (Allgemeine Heeresamt)
The Ordnance Office (Heeres Waffensamt)
The Administrative Office (Heeres Verwaltungssamt)
The Chief of the Mobile Troops (Chef der Schnellen Truppen)
The Inspectorate of Cadet Schools (Inspektion der Kriegsschulen)

(2) The General Staff. The General Staff of the Army is headed by a general officer who is designated as Chief of Staff of the Army General Staff. It is organized into sections corresponding generally to our G-2, G-3 and G-4 Sections. In addition there is a training section, historical section, and an inspectorate of fortresses. The functions of G-1 in our army are divided between G-4 and the Adjutantur.

c. Principles of Organization. The German approach to military organization is one of extreme flexibility since they feel that organizational practice must remain fluid in order to be in a position to take advantage of the rapid progress of science as applied to war. Therefore, German tables of organization serve only as a guide and they should not be considered as inflexible laws. Rigid adherence to tables of organization is made unnecessary through the use of the following fundamental principles:

(1) The Einheit principle. The Einheit or unit principle of organization is based on the inclusion of a standard group, with standard organization and equipment as the basic unit in all organizations of the army where its use is applicable. Such units include the standard rifle group (rifle team, light machine gun team, and a light mortar team) the radio group, the combat train, ration train, and baggage train.

(2) The principle of tactical self-sufficiency of combat units. According to this principle, each combat unit of the German Army, from the basic infantry group to the complete division, is so organized, armed and equipped as to be tactically self-sufficient to accomplish its local combat mission.

(3) The principle of administrative self-sufficiency of combat units. Another and most important principle of German organization is what might be termed the administrative self-sufficiency of tactical units, which requires that each tactical unit responsible for administration be so organized as to be independent as to personnel and transportation of the next higher unit.

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(4) The use of the triangular and square formations. German organization uses both the triangular and square formation. All units whose tactical employment is based on fire and movement are organized with the triangular formation, while all units whose tactical employment is based on shock action alone are organized with the square formation, while purely reconnaissance units use the parallel formation.

d. Staffs, Armies, Corps and Divisions.

(1) Staffs. The Staffs of armies, corps and divisions are organized in a uniform manner and each consists of five sections as follows:
Section I. The General Staff (Generalstab). This section composes the general staff sections of the staff and contains general staff officers only. It usually consists of the following three subdivisions:

Ia - Operations. This subdivision is composed of two groups. The first, under the Erster Generalstabsoffizier (First General Staff Officer), handles operational matters and the disposition of friendly forces. The second, also under the Erster Generalstabsoffizier assisted by the Ordonnanzoffizier (Administrative Officer) keeps up maps, war diary, and liaison with Ic.

Ib - Supply (G-4). This subdivision, under the Zweiter Generalstabsoffizier (Second General Staff Officer) arranges the supply of reinforcements, equipment and ammunition. It handles the evacuation of personnel and prisoners of war, as well as troop movements.

Ic - Intelligence. This subdivision, under the Dritter Generalstabsoffizier (Third General Staff Officer) handles intelligence.

A fourth Section is sometimes added for training.
Section II. (Adjutantur). This section corresponds to our G-1 section (less functions concerning prisoners of war, relations with civil population, which are performed by Ib) and Adjutant combined.

Section III. This is the Judge Advocate section (Feld-justizamt).

Section IV. (Intendantur). This section consists of the various services such as supply (rations, clothing, individual equipment, and pay), medical and veterinary.

Section V. Motor transport supply (including fuel and lubricants) and repair.

In order to perform and organize the work of the staff, the above sections are divided into three groups:

Operations group (Führungsabteilung) comprising Ia and Ic of Section I.

Supply group (Gutiermeisterabteilung) consisting of Ib of Section I and all of Section IV with the supply service and postal service attached.

Personnel group (Adjutantur) consisting of Sections II and III.

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At army and corps headquarters the chief of staff (at divisions the First General Staff Officer), regardless of rank are in control of the entire staff of their respective headquarters.

The general staff officers not only look to the Chief of the General Staff as the head of their Corps, but they also have the right and, under certain circumstances, the duty of reporting to him directly. The chief of staff of a corps or higher headquarters is duty bound to report to the Chief of the General Staff any differences of opinion between himself and his commander. In such cases the organization commander takes the responsibility for the decision and the chief of staff complies to the best of his ability. The Chief of the General Staff is personally acquainted with the most able staff officers.

Subject to the consent of the Chief of the General Staff, a corps or higher echelon commander may choose his chief of staff. It is intended that the two work together as a team. The commander is responsible for decisions. The chief of staff sees to it that these decisions are implemented.

It should be noted that the composition of higher commands is subject to frequent changes. For example, a corps may be shifted from one army to another, as the situation dictates. Likewise, divisions may be moved from corps to corps. Continuity is provided by the commander and his staff who remain as a fixed nucleus and who are trained to work together as a team.

(2) Army. The composition of an Army Group is not fixed but usually consists of 2 to 5 armies. Likewise, the composition of an army (Armeekorps) is not fixed, but varies from 2 to 5 corps.

(3) Corps. The composition of a Corps (Armeekorps) varies from 2 to 5 divisions. Definite information is lacking as to the composition of corps troops, though many new corps units have been identified. Special combat units required by a corps to carry out a specific mission or a main effort are allotted by General Headquarters through the army.

(4) Divisions. The following shows the organization of the infantry, armored, motorized, mountain and light divisions. There are no cavalry divisions in the German army; the last one is reported to have been motorized during the summer of 1941. Recent information states that a tank component, varying from a battalion to a regiment and appropriate auxiliary units have been added to certain motorized divisions, indicating a trend in the German Army toward the formation of a uniform type division, which is in effect a motor-armored division. The composition of the division, to a limited extent, depends upon the mission, terrain and the nature of the hostile defenses.

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The detailed figures below are estimates taken from the best sources available:

(a) Infantry Division.Personnel.

<u>Organization</u>	<u>Officers and Enlisted Men</u>
Divisional H.Q.	152
Reconnaissance Battalion	575
Signal Battalion	474
Engineer Battalion	800
Antitank Battalion	599
Infantry	9447
Artillery	2700
Replacement Battalion	875
Services	2200
Total Strength	17822

Armament. As organized at present the German Infantry Division is equipped with the following weapons:

<u>Weapons</u>	<u>No. in Div.</u>	<u>Distribution</u>
Machine pistols	432	15 per Rifle Co.
Machine guns, light	444	12 per Rifle Co. (Total Regt. 345) 24 Rcn. Bn. 4 Sig. Bn.
		34 Div. Arty. 27 Engr. Bn. 18 AT Bn. 2 Div. Hq.
Machine guns, heavy	112	8 in Rcn. Bn. 12 per IG Co.
7.9-mm. Antitank Rifles	81	3 per Rifle Co.
87-mm. AT Gun	51	12 in Div. AT Bn. 3 in Rcn. Bn. 12 per Inf. Regt.
50-mm. AT Gun	18	Div. AT Bn.
50-mm. Mortar	84	27 per Inf. Regt. 3 in Rcn. Bn.
81-mm. Mortar	54	18 in each Inf. Regt.
75-mm. Infantry Howitzer	20	6 per Inf. Regt. 2 in each Rcn. Bn.
150-mm. Infantry Howitzer	6	2 in each Inf. Regt.
105-mm. Howitzer	36	12 in each of L. Arty. Bns. (Arty. Regt)

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ons	105-mm. Gun *	4	4 in 105/Gn.Btry (Med. Bn. Arty Regt.)
	150-mm. Howitzer	8	4 in each 150 mm. How. (Bd. Bn. Art. Regt.).

The German Army is not bound by rigid tables of organization and each year brings changes not only in composition of the division as a whole, but in the organization and weapons of basic units.

(b) The Armored Division. There is really no such organization as the standard Armored Division in the German Army. The Germans consider the Armored Division as a weapon of opportunity. Consequently, as campaigns are planned, and as situations arise the Armored Division is modeled to meet that emergency. Hence, this type of Division as used in the invasion of Poland is quite different from that used by Rommel in Africa and also different from the latest type of armored Division reported organized in Europe. Whereas, at one time there were three types of "normal" panzer divisions in which the variance existed largely in the composition of the tank component, recent reports indicate the organization of a type which might approximate the normal type likely to be encountered in a normal situation. It is not certain that existing divisions will incorporate these changes.

The general organization of this division is as follows:

<u>Unit</u>	<u>Personnel</u>
Headquarters	185
Motorcycle battalion (for reconnaissance purposes)	1235
Signal battalion	422
Antitank battalion	599
Engineer battalion	877
Tank regiment	3550
Motorized Infantry Brigade**	5342
Artillery regiment	2102
Replacement battalion	875
Divisional services	3312
Total	16599

* In some divisional artillery regiments the 105 mm. gun battery in the medium-battalion is replaced by a 150 mm. Howitzer battery, making this battalion consist of three 150 mm. Howitzer batteries. (Panzer)

**It should be noted that infantrymen in the German armored/divisions are called Panzer Grenadiers; thus, the motorized infantry brigade is called the "panzer grenadier brigades", the motorized infantry regiment is called the "panzer grenadier regiment" and so on.

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Total personnel of the division is approximately 16,600.
Armament of the division is summarized as follows:

Mark I tanks	11 (In Engr. Bn.)
Mark II tanks	67 (2 in Engr. Bn.)
Mark III tanks	106 (Tank Regt.)
Mark IV tanks	34 (Tank Regt.)
Light armored cars	18 (Mtrcl. Bn.)
Heavy armored cars	6 (Mtrcl. Bn.)
Motorcycles (solo and combinations)	1413
Other motor vehicles (excluding Motorcycles)	2884
Light machine guns	806
Heavy machine guns	86
7.9-mm. AT rifles	45
20-mm. Dual purpose (nw./AT) guns	77
37-mm. AT guns	33
50-mm. AT guns	124
50-mm. mortars	45
81-mm. mortars	30
75-mm. infantry howitzers	50
105-mm. howitzers	24
150-mm. infantry howitzers	8
150-mm. howitzers	12

The modified motorcycle battalion has replaced the reconnaissance battalion in the older armored divisions. The motorcycle battalion formerly was a part of the motorized infantry brigade, which now has reconnaissance units only in the infantry regiments.

In the new motorcycle battalion, the machine-gun company has been eliminated, the number of heavy machine guns in the rifle company increased from two to four, the six 81-mm. mortars formerly in the machine-gun company have been transferred to the heavy weapons company, and an armored car company formerly in the old reconnaissance battalion has been added to this new motorcycle unit. Hence, the motorcycle battalion now consists of a headquarters, one armored car company, three rifle companies and a heavy weapons company. The rifle companies and the heavy weapons company have the same armament as the corresponding units in the infantry battalion. (See below).

The signal battalion consists of a headquarters, a radio company, a telephone company, and trains. Total personnel is 422.

The antitank battalion is composed of a headquarters, signal section, three antitank companies and trains. Each antitank company is armed with six light machine guns, four 37-mm and six 50-mm AT Guns. Total personnel is 599.

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The engineer battalion, with a total personnel of 877, consists of a headquarters, an armored company, two light mechanized companies, a bridge column and trains. This battalion is armed with 58 light machine guns. The armored company has 11 Mark I tanks, two Mark II tanks, and four Mark IV tanks, the latter being bridge-laying tanks. The tanks represent a special form of transport, rather than a striking force. This armored company also has two 20-mm. dual-purpose (AA/AT) guns.

The present tank regiment represents an organization whose composition has developed through three distinct stages. In the campaign against France, the regiment consisted of two battalions of four companies each. With a total of 204 tanks, there were 136 light tanks (Mark I and II) and 68 medium and heavy tanks (Mark III and IV). The second stage is represented by the type of regiment used in the first African campaigns. This regiment consisted of two battalions of three companies each. The companies were armed and organized as in the first stage. The third stage was a development of the campaign in Russia, in which there were three battalions of three companies each. In this stage the Mark I tank was eliminated (except for the 11 tanks in the Engineer Battalion which are considered as a special form of transport and not a striking force). An interesting item to note in the evolution of the tank regiment has been the proportion of light to medium and heavy tanks, which has developed from two to one in the first stage to one to two in the third stage.

The present tank regiment is organized in general as follows:

Headquarters

Headquarters company

Signal section (one Mark III and two heavy armored command vehicles)

Light-tank platoon (five Mark II tanks)

Workshop Company

Three workshop platoons

Recovery platoon

Ordnance section

Signal workshop

Trains

Three battalions, each:

Headquarters

Headquarters company

Signal section (one Mark III and two heavy armored command vehicles)

Light-tank platoon (five Mark II tanks)

Engineer platoon (three LMG's)

Motorcycle platoon (four LMG's)

A.A. platoon (eight HMG's)

Two light companies, each

Headquarters (five Mark II and two Mark III tanks)

Three platoons (five Mark III tanks each)

Medium company

Headquarters (five Mark II and two Mark IV tanks)

Two platoons (four Mark IV tanks each)

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Trains
Regimental Totals

Personnel	2,650
Armored command vehicles	8
Mark II tanks	65
Mark III tanks	106
Mark IV tanks	30
Light machine guns	362
Heavy machine guns	24
20-mm. dual purpose (AA/AT) guns	65
50-mm. guns	106
75-mm. guns	30
Motorcycles	190
Other motor vehicles	453

The motorized infantry, with a personnel of 5,342, consists of a headquarters and two motorized infantry regiments, whereas the original armored division had only one infantry regiment along with two regiments of tanks. Several recent changes have been made in both the infantry regiment and the battalion. The engineer platoon has been taken away from regimental headquarters company and an engineer platoon left in the heavy weapons company of each battalion. An antitank platoon has been added to each infantry regiment. In the infantry gun company of the regiment, there are now four 150-mm. and no 75-mm. infantry guns. The number of 75-mm. infantry guns in the heavy company of each battalion has been increased from two to four. The battalion machine-gun company has been eliminated, but two additional heavy machine guns have been added to each rifle company. Also, the 81-mm. mortars formerly in the battalion machine-gun company have been transferred to the battalion heavy weapons company.

Each infantry regiment in the armored divisions is organized in general as follows:

Headquarters
Headquarters company
Signal section
Motorcycle platoon (six LMG's)
A.T. platoon (three LMG's, and three 37-mm. guns,
probably self-propelled)
Infantry gun company (four 150-mm. infantry guns,
probably self-propelled)
Two battalions, each
Headquarters
Three rifle companies, each
18 LMG's
4 HMG's
3 50-mm. mortars
3 AT rifles

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Heavy weapons company

- 4 LMG's
- 3 37-mm. AT guns (probably self-propelled)
- 6 81-mm. mortars
- 4 75-mm. infantry guns (probably self-propelled)
- Engineer platoon

Trains

The Artillery Regiment of the division (with a personnel of 2,102), is organized as follows:

Headquarters

- Signal section
- Meteorological section
- Observation platoon
- Map printing section

Two Battalions (105-mm. gun-hows), each

- Headquarters
- Signal section
- Survey section
- Three batteries (each of four 105-mm. gun howitzers and two LMG's)

One Battalion (150-mm. hows)

- Headquarters
- Signal section
- Survey section
- Three batteries (with four 150-mm. howitzers and two LMG's)

Trains

It is believed that all artillery of the armored Division is being put on self-propelled mounts as rapidly as possible.

Personnel of the replacement battalion is normally 875.

The Services of an armored division include the following:

Division medical unit

- Two medical companies
- Three ambulance sections

Military police section

Field post office

Supply echelon

- Headquarters
- Supply company
- Four workshop companies
- Nine light supply columns
- Six heavy supply columns

Rations echelon

- Headquarters
- Bakery company
- Butcher company

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The type of armored division recently used in Africa and known as the African type differed from other armored divisions largely in the absence of reconnaissance battalion, or motorcycle battalions, and the presence of one rifle regiment of three battalions of four rifle companies and one infantry gun company each.

(c) Motorized Infantry Division (Including the SS Divisions). The motorized infantry divisional organization differs from the normal type of infantry division in the following respects:

(1) The motorized infantry division usually has only two infantry regiments.

(2) The artillery regiment has only three battalions - two light (105-mm howitzer) and one medium (150-mm howitzer).

(3) The motorized infantry division has a motorcycle battalion.

(4) Recently a tank component, sometimes as much as a regiment, has been added to some of the motorized infantry divisions.

(5) In the motorized division, there is a tendency toward the use of partially armored self-propelled antitank and supporting weapons. Frequently, the motorized division is augmented by a battalion of armored assault artillery (75-mm guns on partially armored self-propelled mounts).

The fire power of a motorized division (excluding the tank component and the battalion of armored assault artillery), is summarized as follows:

Machine Pistols	288
L. M. Gs	414
H. M. Gs	88
7.9-mm. AT rifles	63
20-mm. AA/AT guns	10
37-mm. AT guns	42
50-mm. AT guns	18
50-mm. mortars	66
81-mm. mortars	42
75-mm. infantry howitzers	16
150-mm. infantry howitzers	4
105-mm. howitzers	24
150-mm. howitzers	12

(d) The Mountain Division (Gebirgsdivision). A mountain division consists of:

Headquarters

Mountain divisional signal battalion

Two (sometimes three) mountain infantry regiments

Mountain artillery regiment

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Mountain reconnaissance group
Mountain division antitank battalion
Mountain division engineer battalion
Mountain motorcycle battalion
Rear echelon units

The total strength of the Mountain Division, with two rifle regiments, is 15,278, including both officers and enlisted men. The division's fire-power is summarized as follows:

Light machine guns	551
Heavy machine guns	120
Antitank rifles	84
20-mm. AA/AT guns	3
37-mm. AT guns	42
50-mm. AT guns	18
50-mm. mortars	72
81-mm. mortars	48
75-mm. mountain howitzers	52
105-mm. mountain howitzers	12

(e) The Light Division. Light divisions were first reported in action in the summer of 1941 when Field Marshal von Reichenau's Sixth and 17th Armies under General von Stulpnagel constantly employed them in the spearhead of the attack. These were followed by the formation of the 90th Light Division in Libya in the autumn of 1941. Light divisions are still in an experimental stage and several different types are known to exist. However, it seems that the following composition is the one most likely to be favored for European warfare:

Headquarters
Three infantry regiments
Artillery regiment
Engineer battalion
Signal battalion
Reconnaissance unit
Tank battalion
AT battalion
Services

The total strength of a light division is thought to be about 14,000. To date eight of these divisions have been identified.

Organization of units within the division:

Rifle (Jäger) regiments are organized as follows:

Headquarters
Headquarters company
Infantry gun company
Two rifle battalions, each composed of four rifle companies

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Regiments, although similar in organization may differ from each other in armament. However, all regiments are equipped with:

144 LMG's
16 HMG's
24 Light mortars
8 37-mm. AT guns
12 150-mm. assault guns on SPM

The differences in armament consist in the variations in the allotments of the 76.2-mm. field guns and the 76.2-mm. AT guns. One regiment is reported to have 16 of the field guns and 32 AT guns of this caliber. Another regiment is reported to have eight of the field guns and 16 of the AT guns. A third regiment is reported to have 16 of the field guns and eight of the AT guns.

(f) The Parachute Division. There is only one parachute division (7th) known to exist, and little is known of its organization. The composition of such a division will depend upon its mission in a task force. Hence, the factors of personnel, equipment, and armament are extremely flexible. The division is organized, in general, as follows:

Headquarters
Motorcycle messenger section
Antiaircraft machine-gun battalion
Headquarters
Three antiaircraft machine-gun companies
Signal company
Motor transport company
Signal unit
Reconnaissance unit
Headquarters
Two bicycle companies
Cavalry howitzer platoon
Two heavy machine-gun platoons
Antitank battalion
Headquarters
Three antitank companies
Three Parachute infantry regiments, each
Headquarters
Signal section
Motorcycle messenger section
Three battalions, each
Headquarters
Signal platoon
Engineer platoon
Three rifle companies
Machine-gun company
Infantry howitzer company
Antitank company
Infantry column (light)

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Artillery battalion
Headquarters
Signal platoon
Three batteries
Each battery is believed to be equipped with three
75-mm. mountain guns.

(g) The Fortress Division. Fortress or Grenz Divisions have been organized for the purpose of manning the permanent fortifications. Little is known of the details of organization. Three divisions have been identified.

e. Combatant Branches.

(1) Infantry.

(a) The Infantry Regiment (Infantry division). The German infantry regiment is a powerful, flexible unit controlling its own communications, supply, combat engineers, antitank defense, and close support artillery in addition to its three battalions of infantry.

An infantry regiment consists of:-

Headquarters made up of:-
A signal section
A motorcycle messenger section
A mounted platoon, consisting of headquarters and three sections.
An engineer platoon. The platoon constitutes the basic work unit, being organized and equipped so as to be able to effect its own engineer supply. It has a strength of 1 officer and about 54 enlisted men, organized almost exactly as is an infantry platoon, consisting of a headquarters and three sections.

Note: Reliable reports indicate that the above units have been organized into a Regimental Headquarters Company.

An infantry howitzer company (horse-drawn). This is the 13th company of the regiment and it consists of a headquarters, signal section, three platoons each of two sections, each of the latter being armed with one 75-mm. light infantry howitzer; and one platoon of two sections, each of the latter being armed with one 150-mm. heavy infantry howitzer.*

*The Germans give further support to their infantry by means of 75-mm. howitzers, mounted on converted light medium (Pz. Kf. III) tanks. These weapons are described as "assault guns" (Sturmgeschütze), and their role is that of highly mobile, close support artillery. These weapons, used successfully on the Western Front, in the summer of 1940 are organized into battalions and, in 1941, one such battalion was usually attached to each assault infantry division.

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An antitank company. This is the 14th company of the regiment. It is fully motorized and it consists of a headquarters and four platoons. Each of the latter consists of three squads, each armed with one 37-mm. or 50-mm. antitank gun, and one light machine-gun squad; it is thought that the company no longer possesses a signal section.

A light infantry column

Each of the three battalions consists of a headquarters, signal section, three rifle companies and one machine-gun company. These companies are numbered consecutively from 1 to 12 throughout the regiment. The 4th, 8th, and 12th companies are machine-gun companies. Total strength of the regiment is about 3100 officers and men.

The Regimental Staff consists of:

Regimental commander
Adjutant, equivalent to S-1, S-2, S-3, and S-4
Ordonnanz Offizier (Assistant to Adjutant)
Surgeon
Two Veterinary officers
Paymaster (Beamte)*
Kwms master (Beamte) (Functions similar to our ordnance officer and quartermaster)
Signal officer (commands signal platoon)
Mounted platoon leader (a lieutenant who commands the mounted platoon)

The Battalion Staff consists of:

Adjutant
Signal officer (commands the signal section)
Supply officer (commands the rear echelon)
There are two medical officers with the battalion.

(b) The Mountain Infantry Regiment. The German Mountain Infantry Regiment is organized somewhat differently and equipped very differently from the regular infantry regiment. Such regiments are grouped together into mountain divisions which include mountain artillery and correspond to ordinary infantry divisions except that they are specially designed and equipped to fight in really high mountains, not foothills.

The regiment consists of a headquarters, antitank company and three battalions. The total personnel of the regiment is approximately 3500. The armament of the regiment is summarized as follows:

*An official who has the rank of an officer but cannot exercise command functions.

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A T rifles	36
LMG's	178
HMG's	42
50-mm. mortars	27
81-mm. mortars	18
37-mm. AT guns	12
75-mm. mountain howitzers	6

The essential difference between the organization of a mountain regiment and that of an ordinary regiment occurs in the battalion. Each battalion has five companies of which the biggest is the headquarters company. This is necessarily large to provide the command and communication facilities essential for independent action of the battalion. The Germans hold that more often than not the battalion will be so cut off from the regiment by the terrain as to be really independent and hence should be so organized and equipped that it can fight successfully alone in its own terrain compartment. Adequate supply is provided by motor transport, animal-drawn transport, pack animals and human pack carriers if necessary.

(c) The Mountain Infantry Battalion. The organization of the mountain battalion which consists approximately of 11 officers and 1180 enlisted men, as far as can be determined, is as follows:

Headquarters company, consisting of:

Battalion Staff

Communications platoon, equipped with four radio sets, four telephone sets, blinkers, and six dogs
Heavy machine-gun platoon, equipped with four heavy machine guns and own communications section.

Engineer platoon, used primarily for route improvement:
Motor platoon, provided with an unknown number of unit trucks, plus three to five trucks per mountain company attached. This platoon acts as a battalion supply and combat train

Three rifle companies, each consisting of:

Company headquarters, with 4 motorcycles (two always at battalion), also visual signaling equipment

Three platoons, each with three light machine guns

One section, with three 50-mm. mortars

One section, with two heavy machine guns

Heavy weapons company, consisting of:

Headquarters

Communications section (radio and telephone)

Infantry cannon platoon, equipped with two 75-mm. mountain infantry cannon, two telephones and line, two radio sets

Mortar platoon, equipped with six 81-mm. mortars, often attached to the rifle companies in pairs; six telephones and line to lay an OP gun line for each separately attached pair

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(2) Armored Troops. (See Section II, Paragraph 3 d (4) (b) for discussion of elements of the armored division.)

(3) Field Artillery Regiments. Organically the divisional artillery of the infantry division consists of an artillery commander and staff, an observation battalion (motorized), one regiment of three battalions of 105-mm. light field howitzers, horse-drawn, and one medium battalion consisting of two batteries of 150-mm. howitzers and one battery of 105-mm. guns, horse-drawn. The strength of the regiment is 2700 officers and men. Total weapons include:

105-mm. howitzers	36
105-mm. guns	4
150-mm. howitzers	8
MGs	24

Due to the flexibility of the German organization, however, the amount of artillery with the divisions at any given time will depend on the tactical situation.

The Observation Battalion consists of a headquarters battery, a sound ranging battery, a flash ranging battery and an observation balloon battery.

In addition to the artillery with the infantry division, the Germans possess mountain artillery and are constantly increasing the amount of medium motorized corps and heavy artillery.

The field artillery regiment in the armored and motorized divisions consists of three battalions: two light (105-mm. howitzers) and one medium (150-mm. howitzers), all motorized.

(4) The Parachute Regiment. The parachute regiment is organized as follows:

Headquarters	
Signal platoon	
Three rifle battalions, each	
Headquarters	
Signal platoon	
Engineer platoon	
Three rifle companies, each	
Headquarters	
Three platoons	
Heavy weapons company	
Headquarters	
Light mortar section	
Antitank rifle section	
Two machine-gun platoons	
Heavy mortar platoon	
Infantry-grenade company (six 75-mm. infantry or mountain howitzers)	
Antitank company (12 87-mm. AT guns)	
Estimated strength: Approximately 2000	

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Armament (estimated) for each battalion

81-mm. Mortars	4
50-mm. Mortars	9
Light machine guns	54
Heavy machine guns	8
Machine pistols	62

(5) The Reconnaissance Battalion (Infantry Division).

(a) Divisional mounted reconnaissance battalions.

consist of:

Headquarters
Signal platoon
Horse cavalry troop
Bicycle company
Heavy weapons company

Total strength: 575 officers and enlisted men

Total armament:

LMG's	24
HMG's	4
37-mm. AT guns	3
50-mm. mortars	3
*81-mm. mortars	3
75-mm. inf. hows	2
Light armored cars	3

(b) The motorized reconnaissance battalion in the motorized division and in the older armored divisions which still retain this unit is the German version of our motorized cavalry unit. It is organized in general as follows:

Headquarters
Signal platoon
Two Armored car companies (six heavy and 18 light armored cars each)
(In some instances one of these companies is equipped with light tanks instead of armored cars. In each armored car company there are ten 20-mm. AA/AT guns).
One motorcycle company (18 LMG's; two HMG's; three 50-mm. mortars)
One Heavy weapons company, composed of a pioneer platoon, an antitank platoon (of three 37-mm. guns), and an infantry gun platoon (of two 75-mm. inf. hows).
One light ammunition column

Total strength: 30 officers and 701 men

(c) The antitank battalion organization, strength and equipment are exactly the same as the antitank battalion in the armored division.

*The presence of a heavy mortar platoon in all reconnaissance battalions is not confirmed.

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(6) The Motorized Machine-Gun Battalion. At least two types of motorized machine-gun battalions exist in the German Army. All may be classed as G.H.Q. troops. They are:

(a) The Motorized machine-gun battalion, equipped with the MG 34 and organized into:

Battalion headquarters, with a signal platoon,
and two motorcycle MG platoons with four HMG each
Three motorized MG companies
One heavy weapons company (AT guns and 81-mm. mortars)
Trains

The strength of the battalion is estimated to be 920 officers and men. Its equipment includes:

Motor vehicles	360
MGs 34	46
37-mm. or 50-mm. AT guns	6
50-mm. mortars	9
81-mm. mortars	6
AT rifles	9
Motorcycles	172
Other motor vehicles	188

Eleven of these battalions have been identified.

The principal missions of the Motorized Machine-Gun Battalion are:

To support the frontier defense in early stages of war
To constitute a highly mobile G.H.Q. reserve
To form barrier detachments, in conjunction with engineer units, to hold a gap in the line or to protect the flank of an army

(b) The Motorized Antitank-Antiaircraft Machine-Gun Battalion is organized in general as follows:

Battalion headquarters and signal platoon
Three antitank-antiaircraft companies, of three platoons each
Trains

The strength of the battalion is estimated to be approximately 650 officers and men. Its equipment includes:

Motor vehicles	101
20-mm. AA/AT MGs	36
37-mm. or 50-mm. AT guns	12
HMGs	20

It is believed that this type of unit is frequently attached to the infantry divisions. Three battalions have been identified.

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(7) The Engineer Battalion. The Engineer component of the German infantry division is organized as a battalion consisting of:
Battalion headquarters with a signal section
Three combat companies (two partly motorized, one motorized)
Bridge column
Supply train (light pioneer train with tool and supply reserves)
Personnel: approximately 800 officers and men
This battalion is believed to have the following equipment:
Motorcycles 41
Other motor vehicles 67
Horse-drawn vehicles 19
Horses 52
LMGs 27

In addition there are Corps Engineer, Fortress Engineer and Railway Engineer battalions.

The engineer battalion of the German motorized and armored divisions is similarly organized, but it is completely motorized.

(8) The Signal Battalion. The divisional communication unit is the Signal Battalion. In the infantry division this battalion is organized in general as follows:

Battalion Headquarters, motorized
1 Telephone Company, motorized (one section horse-drawn)
1 Radio Company, motorized
Light Column

The total battalion strength is estimated to be 15 officers and 459 men. The battalion has the following equipment:

LMGs	4
Motorcycles	32
Other motor vehicles	103
Horse-drawn vehicles	7
Horses	52

There are also Corps and Army Signal Battalions.

In addition to the Division Signal Battalion, each regiment and battalion has a signal platoon.

The motorized and armored division signal battalions are similarly organized but completely motorized.

(9) Chemical Warfare Service. The Inspector of Chemical Warfare in the German Army is responsible for the coordination of all technical matters pertaining to gas and smoke for the German Army. The chemical troops, designated as Nebel (fog or smoke) troops, form a special arm in the Army. These troops are organized into battalions, which are sometimes grouped into regiments.

The Nebel (fog or smoke) battalion is organized in general as follows:

Headquarters and staff platoon
Signal section

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2 Nebel (fog or smoke) companies
1 Decontamination company
Trains

Each company consists of three platoons. Each combat and degassing platoon consists of four squads, each squad consisting of one NCO and eight men. The total strength of the company is approximately four officers and 170 enlisted men. The total strength of the battalion is approximately 600 men.

f. Noncombatant Troops - Supply.

(1) Principles of Staff Operations. The Germans recognize supply as an integral part of strategy and that it can and most always will exert a decisive influence on the course of strategy and tactics. Due to this influence, they consider the organization and capability of supply when planning every operation. In order that supply will be given full weight and consideration in planning, all German commanders and staff officers are required to have a thorough and intimate knowledge of the fundamentals of supply and an understanding of its problems and execution.

The supply staffs (G-4s) are selected from officers of the general staff who have a thorough knowledge of operations, who possess strong and forceful characters, great ability for organization, and energy. They must be able to think clearly and soundly and have a keen perception of what is required. The Germans feel that only such personalities will be able to solve the problems of supply and find a correct solution in a critical situation.

The German High Command operates on the basic principle: "Force the enemy to conform to your will". This requires careful planning and timing. This means that operations are planned well in advance. Accordingly, the supply staffs, including transportation staffs are among the first to be consulted. This allows the necessary time to calculate the quantities of supplies and transportation required, and it insures that the supply system possesses the necessary capabilities to support the operation. The importance of planning for supply and the realization that the supply plan must support the strategical plan of the Commander are stressed to the highest degree. The planning for supply is never broad or general. The plan is made for a definite operation in a definite area. All facilities and supplies in that area are considered and full use of them planned. The terrain and lines of communication are carefully considered in order to determine transportation requirements. The latter may include ships, railroads, canals, rivers, wheeled transportation of all kinds, pack trains or even man power (necessary for mountain troops), and air transport. The problem is not only to have the supplies on hand but to get them to the troops.

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Supply is organized in depth and adequate reserves are provided for, not on a "schematic system of days" but for the operation. The ability to organize in depth and the maintenance of supply are looked upon in the German Army as marks of leadership in the service of supply.

Great stress is laid on signal communications and other means of communication to insure the operation of the supply system. If the signal communication is overloaded due to the tactical situation, then other means must be found. Only through a good communication system can the supply system be made to operate without friction.

The impetus of supply is from the rear. This does not mean that the Army merely places supplies in depots where the divisions can draw them, but uses every means to get supplies down to the lower units if it will save wear and tear on the divisions. If necessary the Army attaches additional means to the divisions to assist them in carrying out their supply mission. They do not wait until supply begins to break down to do this but they do it in the beginning of an operation. These attachments are arrived at through a thorough estimate of the situation and careful planning.

The German Army organizes and trains units to carry out the supply and evacuation missions. They are as carefully trained as any tactical unit. Each functions under its service chief. G-4, however is responsible for supply and evacuation. He and his assistants do the planning. He issues the orders and sees to it that his orders are carried out. He is the individual who furnishes the power and energy to keep the supplies moving in accordance with his basic plan.

(2) Army supply.

(a) General. The Army carries the major load of supply and evacuation in the theatre of operations. It controls large reserves of all kinds, rear services, trains and labor with which it can build up a main supply effort and assist and supply the divisions. If the organic means are not sufficient, GHQ has additional reserves available which it does not hesitate to turn over to the Army whenever or wherever the situation demands. The Army insures timely and flexible supply by the establishment of depots in depth and width directly under the supply sections. These depots are pushed as far forward as possible and during the attack even sub-depots (the Germans call them branch depots) are pushed forward to the limit of fire. It is the duty of the Army to have the necessary supplies available for the divisions, and well forward so as to reduce the transportation load.

(b) Army G-4 (Quartermaster). Army G-4 in the German Army practically performs the functions of G-1 and G-4 combined in our Army. (The Germans attempt to reduce the number of staff officers whenever possible.)

Army G-4 operates in the same manner as our G-4. He issues orders to his officers without interfering with carrying out their duties within their services. G-4 deals directly with GHQ G-4, or the commanding general of the zone of interior in reference to supply and through the representative of the chief of transportation at army headquarters on transportation problems.

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G-4 is responsible for supply of the Army. He handles his supply problem as he sees fit. He has much greater leeway than in our army as to how he handles his supplies, amounts he places on the ground, keeps rolling, or holds in reserve.

G-4 is also responsible for control of the civil population and order in the rear area, as well as the exploitation of the rear area. For this purpose he has available the commander of the police service who acts as commander of the rear area and the chief of civil administration for handling and working with the civil population. Both work directly under G-4.

(c) Army Base (Nachschubzweiggebiet). The Army Base is an area through which the Army receives its supply from the zone of interior. It may or may not contain the zone of interior depots from which the Army draws supplies. Trains are loaded at the zone of interior depots and routed to the Army Base, thence through the forwarding station (Weiterleitungsstelle) to the army or armies concerned.

This area also contains certain supply administrative offices (Achter), such as commissary (Verpflegungssamt) or ammunition (Munitionsamt), which fill requisitions from the Army and load trains from depots assigned to them.

With permission of the chief of transportation, the Army may hold on call loaded trains within this area.

It was almost impossible to get any information on the subject of the Army Base. The base is not organized as our zone of communications, since the supplies all come directly from zone of interior depots and all supply trains do not necessarily move through the base, but are routed direct.

Germany has a special supply problem in that any probable theatre of operations will always be quite close to all zone of interior depots. It is quite possible that when an advance proceeds so far that direct shipments from zone of interior depots becomes too great, intermediate depots will be established and an area organized similar to our communications zone. However, officers from the German G-4 section state that as the distance increases G-4 simply has to plan further in advance. They also state that it is a distinct advantage to keep loaded trains well to the rear and bring them up as needed, due to the air threat.

(d) Army Rear Services. The army rear services are organized as follows:

Army Supply Train.

Commander and Staff Army Supply Train

Army Truck Train, consisting of:

3 Truck battalions each consisting of:

Battalion commander and staff

6 Motor columns (large) total capacity

approximately 400 tons

1 Gasoline and oil column (large) capacity
13,000 gallons

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- 1 Motor transport repair platoon
- 2 Supply battalions each consisting of:
 - Battalion commander and staff
 - 2 Supply companies
 - 1 Supply company (motorized)
 - 1 Ammunition depot section
 - 3 Field shop companies
 - 2 Engineer depot companies
 - 1 Engineer shop company
 - 6 Depot sections for general, infantry, artillery, gas, signal equipment and motor transport park

Administrative Service (Quartermaster).

- 1 Army commissary section
- 2 Bakery companies
- 2 Slaughter platoons
- 1 Commissary depot section

Medical Service.

Commander and Staff

- 1 Army medical battalion consisting of:
 - Battalion commander and staff
 - 1 Medical company
 - 6 Field hospitals
 - 8 Ambulance platoons (motorized)
- 1 Evacuation hospital regiment consisting of:
 - Commander and staff
 - 2 Evacuation hospitals for seriously wounded
 - 2 Evacuation hospitals for slightly wounded
- 2 Ambulance battalions, each consisting of:
 - Commander and staff
 - 3 Ambulance companies
 - 1 Medical depot section

Veterinary Service.

Commander and staff

- 9 Veterinary ambulance platoons (motorized)
- 3 Veterinary hospitals
- 3 Veterinary laboratories (motorized)
- 1 Animal replacement depot
- 1 Veterinary depot

Road Construction Service.

- 2 Road construction battalions, each consisting of:
 - Commander and staff
 - 3 Road construction companies
 - 1 Motor column (large)

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27Police Service.

Commander and staff (also commander of the army rear area).

2 Guard battalions, each consisting of battalion commander and staff

3 Guard companies (each armed with rifles, six light and three heavy machine guns)

1 Military police battalion consisting of:

Commander and Staff

3 Military police companies

8 Police Headquarters (Ortskommandanten)

Postal Service.

Army postmaster

4 Field post offices (motorized)

The total strength of the army rear services is 12,700 enlisted men and 750 animals. Detailed strengths were not available.

(e) Army Establishments - Army Supply Train. Depending on the tactical situation, the Army may have the following establishments operated by the Army Supply Train:

Ammunition depot. The ammunition depot, or depots, are established by the ammunition section which are on the staff of the supply battalion commanders. They may be set up from 20 to 40 miles in rear of the front line. The initial stockage, as a rule, is around 6,000 tons and maintained at not less than 3,000 tons. The first figure is sufficient to refill all ammunition carrying vehicles in the army. In the attack, to supplement the supply in the depot, at least an equal amount is held on trains in the Army Base.

Engineer depot. The engineer depot is operated by the engineer depot companies. In connection with the depot, an engineer shop operates the necessary repair shops. When necessary a construction material depot is established in the vicinity of the engineer depot and administered by it.

Signal depot. These depots are operated by signal personnel attached to the train.

Infantry Equipment Depot.

Artillery Equipment Depot.

Gas Defense Equipment Depot.

General Equipment Depot (Unit Equipment).

Field Repair Shops.

Motor Transport Parks.

Gasoline and Oil Depots. These depots are established by the motor transport parks beyond the end points of the railway. Tires may also be issued from them.

(f) Army Establishments - Administrative Services.

Commissary Depot. This depot is usually stocked with at least eight days' supply, except bread. It also carries small amounts of

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clothing, individual equipment and office equipment to meet the immediate requirements of troops.

Bakery Companies. These companies are established for the supply of Army troops and to assist the divisions when necessary. When a division bakery is too far to the rear, it may be taken over by the Army and one of the Army bakeries attached to the division. The capacity of a bakery company is 70,000 pounds in 24 hours. The bread must be stored at least 48 hours before delivery can be made.

Slaughter Platoons. These platoons are used to support divisions in same manner as bakery companies. They can process animals per day as follows:

40 beef cattle - equal to	40,000 rations
80 hogs - " "	24,000 "
240 sheep - " "	19,200 "

(g) Army Establishments - Medical Service.

Evacuation hospitals for seriously wounded.

Evacuation hospitals for slightly wounded. These hospitals receive only those patients which can be returned to duty within three or four weeks.

Collecting Stations. These stations are located at railheads and important traffic points at which wounded can be given medical attention and fed, before being transported to hospitals in the zone of interior.

Field Hospitals. These hospitals are set up for Army troops or to support the medical service of the divisions. They may also be set up as hospitals for infectious diseases.

(h) Army Establishments - Veterinary Service.

Veterinary Hospitals. These hospitals care for all sick and wounded animals. They also receive all captured, purchased or requisitioned animals. All animals fit for service or found free from disease are turned over to animal replacement depots. They are set up near a railroad siding or the main supply road. They have a capacity of 500 animals and require 12 hours to set up. They are evacuated by means of railway trains (capacity 360 animals), or army veterinary transport columns (capacity 40 animals).

Animal Collecting Stations. When the distance between veterinary hospitals and the division becomes too great for timely evacuation, collecting stations are set up by the Army.

Laboratories. These are usually set up in the vicinity of veterinary hospitals.

Remount Depot. These are located near veterinary hospitals, preferably on a rail siding.

(i) Army Establishments - Miscellaneous. The Army also establishes salvage collecting points, collecting points for captured material, and collecting points for ammunition (salvage or captured). They are established by the interested service. In addition, bathing and

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delousing installations may be established.

(3) Corps Supply.

(a) General. G-4 supervises and regulates the supply of the divisions, corps troops and attached troops. This supervision for the divisions is effected by prorating supplies to the various divisions, establishing priorities, especially for ammunition, assigning roads when it has not been done by the Army, etc. Normally, supplies move directly from Army depots to division there being no corps establishments or installations. The supply of corps troops and attached troops is handled by the corps G-4 the same as in the division, these units usually being attached to divisions for supply; since the corps has no rear services except those shown below. G-4 takes care that the divisions make timely requisitions for their requirements and that these requests are forwarded to Army G-4.

(b) Rear Services. The rear services of the corps consist of the following:

Corps Supply Train. The corps supply train consists of:

Commander and Staff Corps Supply Train

Corps Truck Train, consisting of:

2 Motor truck columns, total capacity 60 tons

1 gasoline and oil column (large), capacity
13,000 gallons

1 motor transport repair platoon

1 road construction battalion, consisting of:

Commander and staff

3 road construction companies

1 motor column (large)

Military Police. One military police company.

Postal Service. One field post office.

Strength. The total strength of the corps rear services is approximately 800 enlisted men. The actual strength of units is not known.

(4) Division Supply - Divisional Supply Agencies. A general staff officer, corresponding to our G-4, on the division staff is responsible for supply. Also on the divisional staff and under the direction of G-4 are the commander of the ration section (intendant) and the commander of the division trains. Each of these officers has a staff of his own.

The commander of the ration section is responsible for Class I supplies. Under him operate the bakery company and the slaughter platoon. The commander of the division trains is responsible for the organization of the unit baggage trains in the division column, and he commands these assembled trains as long as they remain under division control, releasing them to their units at the appropriate time. He also commands the supply service and the division trains and is responsible for all supply other than Class I supplies. His staff is divided into a supply section and an ammunition section. The following table shows the organization of the division trains and ration section:

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ORGANIZATION OF DIVISION TRAINS AND RATION SECTION

	Personnel				Transportation			Arms	
	Officers	Civilian officials	Enlisted men	Sergeants	Motorcycles	Cars	Trucks	Pistols	Rifles
Staff supply section:									
Supply.....	5	2	19	26	5	2	3	7	19
Ammunition.....	1	--	13	14	1	1	1	1	13
Division supply Company.....	5	--	243	248	4	2	15	7	241
b Division light columns.....	8	--	240	248	8	8	8	16	232
1 light fuel column.....	1	--	28	29	1	1	11	2	27
1 heavy fuel column.....	1	--	56	57	1	1	23	2	55
1 motor repair shop.....	1	--	22	23	1	1	6	2	21
Staff ration section.....	--	7	16	23	--	2	3	7	16
Slaughter platoon.....	1	1	42	44	--	1	6	3	41
Bakery company.....	2	2	145	149	5	2	20	5	144
Total.....	25	12	824	861	26	21	176	52	809

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31(5) Unit Supply Agencies.

(a) General. Each company, troop, or battery, including headquarters companies, has its own organic supply organization known as the Tross. There is no regimental service company in the German army. Battalion headquarters is the administrative and supply unit. Regimental headquarters companies are habitually attached to one of their battalions for rations and administration.

(b) Unit Trains. Following the Einheit principle, all regimental headquarters, battalion headquarters, and company or battery trains (Tross) are similarly organized, with only a slight difference between motorized and horse-drawn units. The trains of each consist of: combat train, ration train, and baggage train.

The combat train consists of the field kitchen and combat wagons. In the combat train is carried the unconserved portion of the day's ration, one day's field ration, one iron ration, cleaning and preserving material, ordnance spare parts, horseshoeing equipment, medical and veterinary emergency supplies, and a reserve of small arms ammunition. Each infantry platoon has a platoon combat wagon carrying ammunition. In the field, the combat train habitually remains with its unit. On the march the combat trains of a battalion march as a battalion column.

The ration train for units not motorized consists of one wagon (two per squadron or battery) in the first echelon. It carries one day's rations and forage. The second echelon, motorized, consists of one medium truck per battalion or corresponding unit. It carries a second day's rations and forage. In motorized units there is only one echelon which consists of one truck per company or corresponding unit. It carries two days' ordinary rations. The vehicles of the ration train haul rations from the battalion ration distributing point to their unit kitchens. In the regimental headquarters and battalion headquarters ration trains, one truck is added. These trucks haul rations from the division distributing point. On the march the horse-drawn elements of the battalion ration trains are formed into a battalion column. The trucks march in the division trains under command of the division ration train commander.

The baggage train of all units is motorized, and it consists of one truck per battalion or equivalent unit. This truck carries three-fourths of the personal equipment of the soldier (the remaining one-fourth being on the man), officers' baggage, and a small stock of clothing and equipment.

(c) Columns. In addition to the unit trains, the following have trains as an organic part of their organization:

The signal battalion, a motorized light column.

The engineer battalion, its motorized bridge train and engineer column.

The infantry regiment, its horse-drawn ammunition column.

(6) Class I Supply. The following rations are carried in the division:

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	Field Rations	Iron Rations
With each man.....	...	1 (reduced)
On each combat vehicle.....	...	1
In the field kitchen/.....	1	1
In the unit ration train...	2	...
In the division train.....	1	...
Total.....	4	3

The system of distribution in the German division is the reverse of that in the American division. In the German division each unit is responsible for drawing its rations with its own transportation from the next higher issuing unit. Thus the division ration train brings rations from the Army D.P. to the divisional D.P. The battalion ration trucks bring the rations for the battalion from the division D.P. to the battalion D.P. The company ration wagons bring rations from the battalion D.P. to the field kitchen. In motorized units the battalion D.P. is eliminated and unit ration trucks draw direct from the division.

The German system, however, is most flexible and is altered in the details of its execution according to circumstances, as for instance, where it is practicable, battalion ration trucks may deliver rations direct to company kitchens.

(7) Ammunition Supply - German Division. From the division ammunition points ammunition is usually hauled by division, regimental, or battalion light columns to regimental, battalion, or battery ammunition points. The combat trains refill from the light columns and haul to more forward positions if necessary. Each infantry regiment has a light infantry column which transports munitions for the light and heavy infantry weapons of the regiment. Each artillery battalion has a light artillery column which transports artillery ammunition. Similarly the light signal, engineer, and other such organic columns transport ammunition as required by their units. Light columns are often held as rolling reserves while a division column unloads ammunition at the battalion or regimental point. Each company, battery, and troop has one or more light trucks, cross-country cars, or wagons which carry combat equipment. These vehicles carry that part of the combat allowance of ammunition not carried on the men or caissons. This ammunition is immediately available for combat. These vehicles also form the transportation link where necessary between the ammunition carriers or guns and the light regimental or battalion columns.

(8) Supply Other Than Class I and Ammunition.

(a) Fuel. The heavy fuel column draws fuel from the army railroad, which it delivers to the light fuel column, which establishes the necessary mobile fuel refilling station of the motor vehicles of the staff and horse-drawn units, and to the fuel trucks of the motorized units.

(b) Motor Maintenance - Motorized Units. First and second echelon maintenance is performed in the unit.

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In time of peace, each motorized battalion has a motor maintenance shop in which third and fourth echelon work may be performed. It is stated that each motorized battalion also has a mobile repair shop for the field. However, it is not known what degree of maintenance can be performed by this repair unit. Third and fourth echelon maintenance in the field can be performed in the division mobile motor repair shop. The next higher echelon of motor maintenance is the army park. Work that cannot be performed here is returned to the zone of the interior. The channels of motor maintenance in the field are as follows:

From unit to battalion
From battalion to division mobile repair shop
and return direct to unit
From division mobile repair shop to army park
and return direct to unit
From army park to factory and return through
any park

(c) Motor Maintenance (Armored Units). In German armored divisions, maintenance is performed by vehicle crews, company and battalion repair sections, and tank regimental armored workshop companies. Divisional service elements include three workshop companies.

Repair sections undertake repairs on a vehicle requiring up to four working hours. Workshop units undertake repairs on a vehicle requiring up to 12 working hours. Army motor parks undertake repairs on a vehicle requiring up to 24 working hours.

German tanks carry a liberal supply of tools, spare parts and equipment for repair work. The tank crews are trained to assist in repair as well as to service and maintain their own vehicles.

The Germans place much emphasis on the immediate recovery of vehicles immobilized during combat. On occasions, detachments have been sent out on the battlefield, in cross-country carriers and protected by several tanks, to recover not only friendly vehicles but to search for and recover hostile vehicles.

6. Second Line Forces.

(1) In peace time, the German Army inactive forces were subdivided into:

- (a) Reservs. All officers and soldiers who have been let out of the active force and who are not yet 36 years of age.
- (b) Replacement Reserve. All men capable of bearing arms who have not served in the active force and who are not yet 36 years old.
- (c) Landwehr. All men capable of bearing arms between the ages of 36 and 45 years.
- (d) Landstrum. All men capable of bearing arms, over 45 years of age (46 to 55).

(2) General Organization of the Police. All police now come under the control of Department III of the combined Reich and Prussian Home Office.

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The present head of the police is also head of the Schutz-Staffeln (SS) (Himmler) and has the title of Reichsführer S.S. und Chef der Deutschen Polizei.

The police proper are divided into:

1. Constabulary (Ordnungspolizei)
 - a. City Police (Schutzpolizei)
 - b. Rural Constabulary (Gendarmerie)
 - (1) Alpine Gendarmerie
 - (2) Motorized Gendarmerie
2. Security Police (Sicherheitspolizei)
 - a. Secret State Police (Geheimstaatspolizei or Gestapo)
 - b. Criminal Police (Kriminalpolizei)

Other types of police are employed in addition to the police proper. These types are the Militarized Police, and auxiliary Police.

(a) The Constabulary. The command of all constabulary is vested in a General of Police; the Security Police come under a senior officer of the Schutz-Staffeln.

City Police (Schutzpolizei). The city police or constabulary police perform the ordinary patrol and traffic control duties and are generally responsible for public order. The organization of the constabulary is not definitely known, but it is probable that its "Bereitschaften," which correspond to companies, are grouped into higher formations known as "Kommandos" and "Inspektionen."

Rural Constabulary (Gendarmerie). The duties of the rural constabulary corresponds to those of the state constabularies in the United States. The motorized branch of this force is housed in barracks and organized into 52 Bereitschaften (companies or task units), which are widely distributed over the whole country and are responsible for the supervision of traffic on the new motor roads (Reichsautobahnen), and other main roads.

(b) The Security Police (Sicherheitspolizei). The security police (SIPo), with its two branches, the criminal police and the state police, constitute one of the most important factors in preservation of the national socialist system. The mission of the security police and security service includes surveillance of the Jews, Communists, Free Masons and other organizations believed likely to undermine the German state. Security police and security service units also follow the invading armed forces and perform limited functions in occupied countries.

Secret State Police (Geheimstaatspolizei or Gestapo). This is the supreme organization responsible for countering any movement directed against the state. It is engaged chiefly in the detection, prevention and prosecution of political offenses. Among its far-reaching activities, which permeate the whole life of the nation, is the censoring of all correspondence and literature to and from other countries which might in any way prove inimical to the interests of the state. Its regular personnel is mainly drawn from the Schutz-Staffeln.

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Criminal Police (Kriminalpolizei). The criminal police are solely concerned with the prevention and detection of nonpolitical crime. They do not wear uniforms. The regional organization comprises 18 Criminal Police Main Branches, 43 Criminal Police Branches, and 69 Criminal Departments. A special school for training criminal police exists in Berlin. The integrity of the personnel employed on criminal police duty is considered especially high.

(c) Militarized Police. These police are semimilitary in character and are quartered in barracks in contrast to that part of the police that live at home. The constabulary provides personnel for the militarized police which are now extensively employed in the occupied territories, thereby releasing troops for services elsewhere. The operational unit is the battalion composed of four companies, the fourth being the heavy MG company. For administration, battalions are sometimes grouped in regiments. Most battalions are partially motorized and include armored car, signal corps, medical and repair shop detachments. Divisions formed from the military police (S.S. Polizei Division) also exist. They are organized similar to the ordinary infantry divisions.

(d) Auxiliary Police (Hilfspolizei). This additional body of police was employed in Poland, where it helped the militarized police (rural constabulary, above) to clean up back areas. It is still employed in this connection and may also be encountered in other occupied countries.

(e) Special Police. There are a number of special police formations within Germany. These formations function as a part of the centrally controlled police organizations. Such formations include:

Railway Police (Bahnpolizei)
Post Office Guards (Postschutz)
Factory Guards (Werkschutz)
Stream and Navigation Police (Strom und Schifffahrtspolizei)
Waterways Protection Police (Wasserschutzpolizei)
Air Police (Luftpolizei)

(f) Air Raid Precaution Police. Recently (after the large-scale air raid on Cologne) this type of police organization was organized as a branch of the Sicherheitsdienst for work in important areas. This branch is chiefly concerned with fire fighting, decontamination, demolition and rescue work. A considerable portion of these organizations is housed in barracks. There are also motorized battalions. The personnel includes both sexes. Individuals can be drafted for this duty and sent to distant localities, where they render full time service.

(3) Nazi Party Troops. No estimate of the German military strength would be complete without consideration of the organized semimilitary forces.

(a) The S.S. (known variously as Schutz-Staffel, Black Shirts, or the Corps d'Elite) is the most powerful and closely knit element of the Nazi Party. It was organized territorially into 17 districts. In these districts the men were organized into approximately 30 brigades. In estimating the value of the S.S. as a military force it is necessary to differentiate sharply between the Verfuehrungs-Truppen and the ordinary S.S. Those two components of the S.S. are organized differently, differ-

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in discipline, armament, and training, and from a military standpoint have two quite different ultimate values. In the ordinary S.S. the service is voluntary and the members serve without pay. Each member generally devotes one or two nights a week to the S.S. drill and service. The Verfuehrungs-Truppen Corps is a long-service, paid body of party troops organized exactly as similar units in the German Army. The term of service is for four years and the pay is similar to that of the Army. These troops are fully armed, equipped, and well-trained and may amount to ten divisions. This military force is under full S.S. control in time of peace but upon mobilization, its regiments and battalions passed automatically under Army jurisdiction. The units have a certain independence and may be compared to Marines attached to our Infantry Divisions.

(b) The S.A. (Sturm Abteilung), Storm Battalions, or the Brown Shirts was organized territorially into 25 districts, with a strength of about 1,500,000 members. On January 19, 1939, Hitler decreed that the S.A. should be incorporated into the military reserve system of the German Army and that its organizations should take over in peace the military refresher training of all reservists released by the armed forces. This revolutionary change completely changed the role of the S.A. and saved it from approaching oblivion. The National Socialist Mounted Corps, a special section of the S.A., has been formed in order to improve the riding training of cavalry recruits.

(c) The Technical Emergency Help Corps (Technische Nothilfe) furnishes emergency technical help for the operation of industries or utilities vital to the public interests. It is composed of technical experts and workers of sworn loyalty, is uniformed, and has a military form of organization. In peace it was used primarily for the protection of localities in Germany. Since the beginning of the war the Technical Emergency Corps has furnished emergency technical assistance in the operation of industries and utilities in newly occupied territories. This organization concentrates on such tasks as the reconstruction and the maintenance of municipal electrical and water systems, as well as hydroelectric power plants. In one instance, personnel from this organization was used in bridge construction.

The personnel of this organization is limited to specialists, a large part of whom is in the older age groups, excused from military service. The estimated total strength of this organization is 150,000.

(d) National Socialist Motor Corps (NSKK) with its motor schools, is a very important aid to the Army Motorization School in giving basic instruction in motor driving and maintenance. During the campaign in the West some NSKK units, organized in battalions, were used to transport troops and supplies from the zone of the interior to the armies in the field. This function has been intensified in the Russian campaign.

It is estimated that the present personnel strength of the NSKK is between 200,000 and 250,000.

(e) German Labor Service (Arbeitsdienst). The German Labor Service is composed chiefly of young men of pre-military age, and it corresponds in many respects to our former Civilian Conservation Corps. A number of Labor Service units have been organized into battalions, which have been armed with rifles, equipped with appropriate transportation and tools, and sent out to assist combat engineers in road construction and

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maintenance, as well as in the construction of airdromes. These units have also been used to collect captured material, handle ammunition, rations and other supplies, within or in rear of the combat area.

The estimated total strength of Labor Service organizations performing tasks for the Army and the Air Force is 500,000.

(f) Organization Todt. The Organization Todt, which played an important part in the construction of the West Wall and Germany's modern motor highways, is now assisting the army by constructing and maintaining roads in Russia. This organization also is used in the construction of coast defense installations in the occupied territories of Western Europe. Its principal mission during a campaign is to follow in the wake of the army to effect permanent reconstruction and maintain the lines of communication so that supplies of men and material can reach the combat areas with the minimum delay. Its personnel consists principally of older men, with an appropriate proportion of laborers and technicians to accomplish their tasks.

The strength of the Organization Todt in 1942 according to British estimates, totals 450,000. Of this number, the same source estimates that only 200,000 are Germans, and the balance (250,000) consists of foreign laborers and prisoners of war.

The Organization Todt comprises the following services:

Administration: Central Organization at Avus-Nordschleife Berlin West.

Chief Work Departments

Front Control and Security Services

Chief Camps

Camp Groups

Supply Camps

Police

Medical Administration

The Berlin Central Organization at Avus-Nordschleife Berlin West comprises, besides the Administration proper, a medical service, a dental clinic, a service of rail transports, a road transport service, a repair service, a postal service, a clothing center, and other services.

The Chief Work Departments which direct the various work services are in daily direct liaison with Berlin.

The Front Control takes care especially of the men who work in the various camps, paying particular attention to the interior services of the camps.

A Security Service is added to this subdivision.

The Chief Camps are commanded by a Lagerführer. In every large camp there is a permanent hospital. In a general way all camps are allotted a certain number of truck columns.

Each Camp Group is led by a Gruppenführer. They are sent wherever work is to be done and they are fed from the Chief Camp. The group is visited every day by an engineer and every three days by a physician.

The Supply Camp is an installation for the supply of raw foods only. The various services call there for their rations at the designated days and hours.

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Police. Organization Todt police are recruited from members of the organization. They receive premilitary training and assure security by day and night of important work as well as the safety of trains and trucks of the organization while enroute.

The Organization Todt Medical Administration functions entirely independently of any of the other Todt services. It is under a surgeon general in Berlin and is administered by regional centers. In the North of France there is a surgeon and an ambulance for every 4000 to 6000 men and a hospital for each camp of more than 500. Each hospital has a waiting room, a dressing room and six to eight cots for slightly ill men.

The recruitment of Organization Todt workers is accomplished partly by the employment bureaus, which send the men to the Berlin Central office, partly by scanning the public works and industrial plants for a certain percentage of engineers, technicians and workmen. The most sought after are the small public works undertakings. Frequently the employer comes with all his workmen, his accounting department, trucks, tractors, concrete mixers, and other equipment. Thus, the Organization Todt becomes the employer under quite advantageous conditions. This is particularly true of German workers and those from the annexed provinces. The hiring of German workers is for a minimum of one year. Foreign workmen are hired by regions and through employment agencies. Workmen who live far from the camp are quartered by the organization, picked up by motor transportation and fed at noon in the camps. The foreign workers who live in the region where the work is done go home every night. It is noteworthy that most of the Germans hired by the Organization Todt, have been working for the organization since 1938, when construction of the West Wall began. Since then their number has steadily increased.

4. Equipment. a. Individual. The troops all have excellent uniforms, rations, and tentage. Their arms and material may be summarized as follows:

(1) Infantry. All enlisted men are armed with the carbine and bayonet. Officers and noncommissioned officers have automatic pistols and all enlisted men carry hand grenades. Infantry rifle units are armed in general as follows:

Rifle - Mauser, Cal. 7.9 mm., "Karbiner 98 k."
Bayonet - sword pattern, known as "Seitengewehr 84/98." It is 1' 3" long and weighs 1 lb. and 4 oz.

Automatic Pistol - Cal. 9 mm., "Pistole 08." It is semi-automatic and its magazine holds eight cartridges.

Machine Pistol - (Schmeisser) - machine pistol, cal. 8.9 mm.

(Steyr-Solothurn - machine pistol, cal. 9 mm.

Hand Grenade - potato masher type. Egg-shaped grenades are also used, especially by armored units.

(2) Artillery. All officers and noncommissioned officers are armed with the automatic pistol. Platoon commanders are sometimes armed with the machine pistol. All enlisted men are armed with the carbine and carry hand grenades.

(3) Reconnaissance Battalions. Officers in mounted reconnaissance battalions are armed with the sabre and automatic pistol. All enlisted

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men are armed with the carbine (with bayonet), saber, and hand grenades.
Saber - Curved blade type.

(4) Engineers. Officers and enlisted men of the pioneer companies are armed with the rifle, bayonet, and hand grenades.

(5) Police. The individual armament of the Security Police consists of:

The automatic pistol, carbine and bayonet, and sword.

(6) General. German soldiers of all units are armed with the carbine.

b. Organizational.

(1) Machine Gun 34, Cal. 7.9 mm., is the type most commonly used. It is air cooled and it is employed both as a light (bipod) and heavy machine gun (tripod).

(2) Infantry Mortars - Light, Cal. 50 mm.; Heavy, Cal. 81 mm.

(3) Infantry Guns - Light, Cal. 75 mm.; Heavy, Cal. 150 mm.

(4) Antitank Armament - Antitank Rifles - 7.9 mm.; known as the "Panzerbüchse."

Antitank Guns - 20 mm., 37 mm., M 41 (with the barrel constructed on the Guerlich principle, tapering from 28 mm. to 20 mm.) Also the Pak 41, Guerlich principle, tapering from 42 mm. to 28 mm. The 50 mm., and the captured Russian 76.2 mm. gun, the 20 mm. Super Heavy Machine Gun, and 47 mm. and 88 mm. AA Guns are very effective AT guns in addition to their use as AA.

(5) Field Artillery:

Guns - Cal. 105 mm., 150 mm., 210 mm., and 240 mm.

Howitzers - Cal. 105 mm., 150 mm., 210 mm., 240 mm., and 300 mm. In motorized and armored divisions, the artillery is drawn by half-track prime movers.

(6) Self-Propelled Guns.

20 mm. Super Heavy Machine Gun AA and AT (mounted on a half-track vehicle).

47 mm. Antitank Gun (Generally mounted on the M I tank chassis).

47 mm. AA and AT Gun (Mounted on a half-track vehicle).

75 mm. Assault Gun (mounted on the M III tank chassis).

105 mm. Assault Gun (reported) (probably mounted on the M III tank chassis).

150 mm. Assault Gun (mounted on a M I tank chassis).

(7) Armored Fighting Vehicles:

Armored Cars - Light (4 wheel), medium (6 wheel), and heavy (8 wheel).

Tanks - Light (Pz Kw I): Weight approximately 5.7 tons; armament two M.G.'s; crew, 2 men; speed 23 m.p.h. on roads. This tank is obsolete as a combat tank. It is now used principally for liaison and reconnaissance purposes.

Light (Pz Kw II): Weight approximately 9 tons; armament two M.G.'s, one of which is a 20 mm. antitank type weapon. Crew, 3 men. Speed, 20-25 m.p.h. cross country on hard level ground.

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Medium (Pz Kw III): Weight 18-20 tons; armament 1 - 37 mm. or 50 mm. cannon and 2 M.G.'s; crew, 3 - 5 men; speed, 28 m.p.h. In late models the 50 mm. cannon is replaced by a 50 mm. antitank type weapon.

Medium (Pz Kw IV): Weight 22 tons; armament 1 - 75 mm. gun and 2 M.G.'s; crew, 5 men; maximum speed 31 m.p.h. In late models the 75 mm. gun is replaced by a long-barreled antitank type weapon.

Heavy (Pz Kw V): Weight reported to be 30 tons; armament 1 - 75 mm. gun and 1 - 37 mm. gun in a horizontal coaxial mount; 3 M.G.'s; crew 7 - 8; speed 20 m.p.h. There are no confirmed reports of the actual use of this tank in combat.

Heavy (Pz Kw VI): Weight reported to be 36 - 40 tons; armament 1 - 88 mm. or 105 mm. and 1 - 37 mm. gun in a vertical coaxial mount, 3 M.G.'s; crew 7 - 8; speed 20 m.p.h. A tank of this type was reported in use in Tunisia in December, 1942.

Note: Super heavy tanks of 60 tons plus are reported as being developed.

(8) Troop Carriers - Light cross country cars, trucks, motorcycles, and armored troop carriers.

(9) Chemical Warfare. For smoke - Portable and nonportable generators, smoke boxes and smoke candles. The 100 mm. mortar, the 150 mm. mortar, the latter known as "15 cm. Nebelwerfer 41", are the weapons commonly used by smoke units.

For Gas - Details unknown but believed that such equipment is on hand.

(10) Engineers. Combat engineer units are equipped with two types of portable flame throwers, one carried on the back of a man and the other pulled by hand on a small two-wheeled cart. These engineer units are also provided with Bangalore torpedoes and explosive charges weighing about two pounds carried on the end of a twelve-foot pole. Appropriate engineer units are equipped with pontoon, pneumatic boats, and assault boats. The latter are propelled by an efficient outboard motor.

(11) Signal. Divisional signal units are responsible for communication from division headquarters to the headquarters of the infantry regiments, artillery regiment, engineer battalion, and antitank battalion of the division and to the headquarters of the formation on their right. The regimental and battalion signal detachments have sufficient radio and telephone equipment to maintain communication with their subordinate units.

(12) Prime movers. Half-track vehicles have been developed in six standard types for use as prime movers:

1 Ton	90 Horsepower
3 ton	95 "
5 ton	95 "
8 ton	115 "
12 ton	150 "
18 ton	230 "

The above types of vehicles are used for various purposes, such as gun tractors, recovery tractors, mobile gun platforms for light AA and AT guns, armored personnel carriers, armored command vehicles, ammunition carriers and communication vehicles.

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In addition to the above, a motorcycle tractor has been developed. This vehicle consists of a small half-tracked chassis with a single motorcycle-type front wheel. This wheel is steered by handle bars similar to that of a standard motorcycle. This vehicle is believed to be used as a tractor for light guns and ammunition trailers. It is powered with a 40-horsepower engine.

(13) Supply Vehicles. The supply vehicles are both types: animal-drawn, and motor. The motor vehicles in general use are 1½ and 2-ton trucks.

5. Training, Efficiency, and Morale. a. Training. The training of German troops is of the highest possible order. The basic infantry training is regarded as vital for every soldier and officer and in addition, equivalent physical, educational, and special training is given in the various branches for every rank.

b. Efficiency. The efficiency of the German Army is very high, probably outranking any other. In the German Army, infantry divisions, motorized divisions, and armored divisions, have approximately equal combat value within their respective types. The Army as a whole has efficiency of the highest type and has shown itself capable of giving an outstanding performance in battle.

c. The morale of the armed forces is high, due not only to the success of German armies, but also to the realization that Germany is in a critical period in her aspirations to become a great world power.

6. Mobilization Plan. a. General Method. Mobilization and replacement have been organized in such a way as to produce the greatest possible military force without materially weakening the industrial power of the nation.

b. Probable Labor Resources. German industry and commerce at present employ approximately 25,000,000 wage earners and salaried workers, of whom nearly two-fifths are women. Some 2,000,000 prisoners of war and 3,000,000 foreign civilian workers are employed in German industry and agriculture. The latter figure is being increased steadily and, together with women, youths, and pensioners recalled to employment, virtually replaces the manpower inducted into the armed forces.

c. Reserve Supplies. Due to the large stock-piles accumulated before the war and the booty from occupied territories, reserves of all but a few types of raw materials seem to be sufficient for military needs under the stringent quota system in force.

d. System of Industrial Coordination. Germany has progressively organized its industrial and all other resources for war ever since 1933. Every sphere of human activity is governed by a complex but efficient organization, so that the whole life of the nation can be swiftly adapted to any circumstances. Maximum speed and efficiency of military procurement is provided through the Ministry of Munitions, created in 1941.

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42III. THE AIR FORCE.

7. German Air Force Battle Strength in Personnel and Equipment.

a. Personnel.

Pilots	63,750
Non-flying Officers	26,250
Air Signal Troops	75,000
Air-Borne Troops	75,000
Antiaircraft Troops	1,000,000
Enlisted Men	<u>712,000</u>

TOTAL PERSONNEL 1,952,000

b. Combat Aircraft.

Long Range Bombers	1,950
Bomber Reconnaissance	450
Dive Bombers	550
Total Bombers	<u>2,950</u>
Single Engine Fighters	1,350
Twin Engine Fighters	750
Total Fighters	<u>2,100</u>
Army Cooperation	500
Coastal	200
Total first-line aircraft	<u>5,750</u>
All other combat aircraft	4,050
TOTAL COMBAT TYPES	<u>9,800</u>

8. Organization. a. General. The German Air Force (Luftwaffe) is one of the three major branches of the German Armed Forces (Wehrmacht). Although the Air Force has its own Commander-in-Chief, its own Chief of Staff, and its own G.H.Q., it is, like the Army and the Navy, entirely subordinate to the Headquarters of the Armed Forces.

The chain of command in the Air Force is from the Supreme Commander-in-Chief of the German Armed Forces (Hitler); through the Chief of the Supreme General Staff to the Commander-in-Chief of the Air Force (Goering).

Reich Marshal Goering commands the Air Force through the Air Ministry and through his subordinate commanders of air combat units. Air combat units operate as a part of the various task forces under the task force commander. In this way, coordination of air and ground effort is assured.

A task force may be composed of any one, two, or even all three branches of the German Armed Forces. When units of the Air Force are assigned as part of a task force team, they are under the direct control of the task force commander, who may employ them as he sees fit in order to accomplish his assigned mission.

b. Commander-in-Chief. Reich Marshal Goering serves in the dual

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capacity of Minister of Aviation and Commander-in-Chief of the Air Force (Luftwaffe). As Commander-in-Chief of the Air Force he is charged with the administration and operation of the Air Force, with the exception of the operation of those combat units assigned to a particular task force. As Minister of Aviation he is a member of the Cabinet and is responsible for the coordination and supervision of civil aviation.

c. Air Ministry. The Air Ministry is organized into two major sections, (1) the Command Section, directly under the Commander-in-Chief of the Air Force and (2) the Administration and Supply Section, under the direction of the Secretary of State for Air and Inspector General. The Secretary of State for Air and Inspector General is second in command to Commander-in-Chief Goering.

(1) Command Section. The Command Section of the Air Ministry is charged with tactical operations. It is composed of the following subdivisions:

(a) Army Aviation Commander and Inspector of Army Aviation. This officer has command of all personnel, airplanes, antiaircraft artillery, and air communications assigned to the Army. He is directly responsible to the Commanding General of the Army for operations.

As Inspector of Army Aviation this officer is responsible to the Commander-in-Chief of the Air Force for the condition of equipment and training of personnel. He also functions in an advisory capacity to the commanding General of the Army and is liaison officer between the Commander of the Air Force and the Commanding General of the Army.

(b) Naval Aviation Commander and Inspector of Naval Aviation. This officer functions for the Navy exactly as the Army Aviation Commander and Inspector of Army Aviation functions for the Army.

(c) Chief of the Minister's Office and Special Staff. This officer functions in an administrative capacity for the Air Minister in either his military or civil air capacities. He also coordinates civil and military aviation matters. Included in his office is a small advisory staff which studies policies and advises the Commander of the Air Force in general terms.

(d) Aerial Armament Commission. This is a permanent commission which examines all armament problems and advises the Commander of the Air Force thereon.

(e) The Air Force General Staff. This staff is concerned with perfecting plans for the use of the Air Force in all emergencies. It has no command functions. It contains Intelligence, Operations, Organization, and Quartermaster Sections.

(f) The Air General Staff School. This is a special staff school designed to educate Air Force officers for duty with the Air General Staff.

(2) Administration and Supply Section. This section is charged with the general administration, inspection, training, and equipment of the Air Force. It includes the following offices:

(a) Office of the Chief of Air Force. This office has the following subdivisions:

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General Administration Branch, which handles all Air Force administration, including budget, pay, clothing, and buildings and grounds.

(a) Personnel Branch, which administers all personnel, both military and civilian.

(b) Miscellaneous Air Office, which is primarily, concerned with air defense, both active and passive. It also administers civil aviation (both in war and peacetime), insurance, and the air police.

(c) Central Section of the Air Ministry. This office is concerned chiefly with relations between the offices of the Air Ministry and offices external to the Air Force, and with the administration of the Air Ministry building. It contains the Legal, Attache, Press, and Ministerial offices.

(d) Office of the Chief Engineer and Quartermaster General of the Air Force. This office handles all design, research, technical development, construction, testing, employment and supply of material, procurement, repair, and disposition of all Air Force equipment. It also handles all questions concerning the German aircraft industry.

(e) Office of the Chief of Training and Education. This office administers all Air Force training, with the exception of the Air General Staff School. It also inspects training, equipment, and fitness for use of all branches of aviation.

(f) Office of the Chief Signal Officer. This office is responsible for the administration of all matters pertaining to telephone, teletype, and radio communications in the Air Force.

d. The Air Force. The German Air Force consists of regular air personnel, antiaircraft personnel, signal troops, parachute troops, and air infantry personnel.

(1) Territorial Organization. Prior to the war, the German Air Force was distributed on a purely territorial basis. The country was divided into four sections with an Air Fleet (Luftflotte) assigned to each section. Each territorial section was then subdivided into two or more Air Districts (Luftgau) for administrative purposes. The tactical direction of all units in the section was the responsibility of the Air Fleet Commander. Thus the term Air Fleet originally embraced both a territorial and a tactical command, although the tactical command remained a mobile unit.

When the war began, tactical units were moved into the various theaters of war. As an Air Fleet moved from one front to another its original identity was lost. Thus, identical geographical boundaries for both tactical (Luftflotte) and administrative (Luftgau) commands could no longer be maintained. It therefore developed that the boundaries of the Air Fleets became fluid and changed with tactical operations, while those of the Air Districts have remained fixed.

The Commander of each Air District is responsible for the active and passive defense of the District; for the administration, supply and maintenance of all units in his Command; for all training other than auxiliary units; and for antiaircraft artillery in his District not otherwise assigned to the field army or for special tasks. He is also charged

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with the recruitment, mobilization, and training of reserve personnel.

Air District headquarters are located primarily in Germany proper, but Luftgau units have moved into the various fronts and occupied territory with the task forces. 16 Luftgaue are known to exist at present. 5 of these are in occupied territory and are really offshoots of prewar Luftgau in Germany. These offshoots still depend on their parent Luftgau for certain services, such as operational airfields and signals units, and are not believed to have undertaken training and recruiting.

During campaigns the Luftgaue follow the combat units and provide supplies and services through a system of subordinate commands known as Luftgaustäbe zur Besonderer Verwendung (Air District Staffs for Special Duty), or simply, Luftgaustäbe Z.B.V. The area allotted to a Luftgaustab Z.B.V. command is usually identical with that of a Fliegerkorps. Thus, each Fliegerkorps has at least one Luftgaustab Z.B.V. responsible for its immediate administrative and supply demands.

(2) Tactical Organization.

(a) Air Fleet (Luftflotte). The tactical or combat forces at present consist of five well established and two partially formed Air Fleets. Each Air Fleet is assigned to a particular operational or command area, but the entire Air Fleet or any of its component parts may be moved in or out of its command area at the direction of the High Command. The entire operational strength of the German Air Force - except for a few fighter units employed in home defense and those Army Cooperation and coastal units attached to the Army or Navy - is under the command of the Air Fleet Commanders.

(b) Air Corps (Fliegerkorps). The operational commands directly subordinate to the Air Fleet are the Air Corps. One to three Air Corps usually form an Air Fleet. These Air Corps were formed by expanding the peacetime Air Divisions which they have now largely replaced.

(c) Air Division (Fliegerdivision). Two Air Divisions continue to exist. One, Fliegerdivision VII, is composed of Parachute and Air Landing troops. (See Par. (3) Air Force Arms and Services.)

The second Air Division is unnumbered. It is known simply as the Lehrdivision and specializes in tactical experiments and developments. These Lehr units are incorporated directly into and operate as a part of the Fliegerkorps and other combat commands during the time of war. They consist of various types of formations, regiments, aircraft, etc., and operate only with experienced personnel. Their primary function is to test the latest types of aircraft, antiaircraft guns, and other service equipment from a tactical and operational standpoint and to devise the best methods for their employment. There are two Lehrgeschwadern composed of bomber, fighter, and reconnaissance Lehrgruppen. There are also two Lehrregimenter, one concerned with antiaircraft and the other with signals development. The Lehr units are not to be confused with experimental units whose duties are of a technical character, such as the testing of prototype aircraft.

(d) Separate Commands. Fighter Commands have been established in all but one Luftflotte since the outbreak of war. The Commanding Officers of these Commands have an overriding authority over all fighter units in their respective Luftflokts, and are responsible only to the

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Air Fleet Commander. Their authority is usually confined to matters of policy, but they may be allotted combat units for specific operations. A special night-fighter unit, Fliergerkorps XII, has been formed to defend northwest Germany, although it also carries out offensive patrols. These are the only separate Commands of this type in the G.A.F.

(e) Flight Formations. Operational Flight formations fall into two groups according to aircraft types: i.e., (1) the Geschwader organization for long range bombers, dive bombers and fighters; and (2) the operationally-autonomous squadrons for reconnaissance and Army Cooperation.

i. The Geschwader is the largest mobile homogeneous formation in the G.A.F. It normally consists of three Gruppen plus a fourth Gruppe known as the Ergänzungsgruppe (Reserve Operational Training Unit). It is commanded by a Colonel or Lieutenant Colonel who has a small Staff and a Headquarters Flight of 6 aircraft of the same type as those in the Geschwader.

The Gruppe is the basic combat unit of the G.A.F. It, too, is a mobile, homogenous unit and is composed of 3 Staffeln. It is largely self-contained and may be detached from the parent Geschwader for operations in any theater. Commanded by a Lieutenant Colonel or Major, it has a small Staff and its own Staff Flight of three aircraft. It generally occupies an entire Air Station (Fliegerhorst) and the Gruppe Kommandeur becomes the Fliegerhorst Kommandant while the Gruppe is at the station.

The Staffel is the lowest G.A.F. mobile operational unit. It consists of an initial establishment (I.E.) of 9 aircraft plus an immediate reserve (I.R.) of 3 aircraft. It is generally commanded by a Major, Captain, or Lieutenant. For tactical purposes it may be subdivided into Schwärme (5 aircraft), Ketten, (3 aircraft) or Rotten (2 aircraft).

ii. Bomber reconnaissance, Army cooperation and coastal aircraft operate as autonomous units, usually as Staffeln. The Staffeln are loosely organized into a Gruppe for administrative purposes, but there is no Gruppe Staff or Headquarters Flight. Such a Gruppe may consist of anywhere from 2 to 9 Staffeln.

(3) Air Force Arms and Services. The Air Force Arms and Services are comprised of the usual garrisons and certain special service units.

(a) Garrisons. Garrison organization closely resembles that in the United States, but staffs and administration are simplified. Semimilitary personnel do most of the fatigue duty around the post. In addition, many garrisons have a station complement which remains at the post when troops are away.

(b) Antiaircraft Artillery. German antiaircraft artillery is an arm of the German Air Force and is under the control of the Air Ministry except for (1) some coastal guns manned by the Navy and (2) motorized Army antiaircraft units referred to as Fla (Flieger Abwehr). All other services of active ground defense - guns, searchlights, and balloons - are manned by Air Force personnel and are known as Flak (Flieger Abwehr Kanonen).

Each Luftgau area has Flakgruppen which administer the Flak units within its district. Flakgruppen are then subdivided into Flakuntergruppen. As deployed by the Germans, Flak has the following missions:

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- i. To provide the general air defense of Germany and the occupied territories.
- ii. To provide special concentrated defense in specific areas or places where important industrial or military targets are located.
- iii. To provide defense for German troops, military establishments, and air forces in the various theaters of war.
- iv. When part of a task force, to perform any mission assigned to it by the task force commander. These missions include anti-tank, assault of fortifications, counter-battery, and direct support of other ground forces.

The first two of the above missions are performed by units attached to the Air Districts under an Air Force Commander, and known as Zone of Interior Units. These units are actually a combination of mobile and stationary units. The third and fourth missions are accomplished by Mobile Units assigned to and operating as a part of Army and Air Forces.

German Flak organization is very flexible, and the organization of the particular Flak unit is usually designed for the type of duty which the unit is to undertake. For example, the Flak Corps assigned to a Panzer army is smaller, more flexible, and more mobile than the Corps assigned to a rear objective such as the city of Berlin.

The Flak Corps is the largest anti-aircraft unit and usually consists of two or more Divisions and such auxiliary units as are necessary. Ten such Corps have been identified.

The Flak Division or Brigade is usually composed of the following:

Two regiments of 88 mm. guns.
One regiment of 105 mm. guns.
One battalion of 105 mm. guns (to be increased to a regiment when material becomes available.)
One signal battalion.
Supply units.

A Flak Regiment is usually made up of two gun and one searchlight battalions (Abteilungen) number I, II, and III, plus the necessary supply, maintenance, and administration units. Attached to each regiment is a fourth or Ersatz Abteilung (depot training battalion) which is usually static at its home station.

A Flak Battalion is the basic anti-aircraft artillery tactical unit. Abteilungen I and II consist of three heavy and one or two light gun batteries. Abteilung III is always a searchlight unit with three batteries of nine to twelve 60-inch lights and six to twelve sound locators each.

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The Zug or platoon is the smallest operational Flak unit and consists of two heavy and three light guns.

Special Flak units have been formed to meet specific demands. For instance, in the large rear area commands such as defense of important industrial cities, there are heavy gun regiments, medium and light caliber automatic weapon regiments, and searchlight regiments.

(c) Air Signals Service. The G.A.F. has its own signal units known as Luftnachrichtentruppen which are responsible for the following:

- i. Operation of the communications net and Observer Corps for the air defense of Germany.
- ii. Transmission of all orders and communications necessary for the functioning of the Air Forces.
- iii. Establishment and supervision of all navigational aids to aircraft.
- iv. Interception of enemy signals.
- v. Control of air traffic, air safety, and air rescue services.

The air signals service is organized into brigades, regiments, battalions, companies, and platoons. An air signals regiment consists of two battalions. The first battalion is normally a mobile operational unit divided into seven or eight companies of wireless telegraph, telephone, teletypewriter, sound locators, raid reporters, etc. The second battalion is a recruiting and training unit.

The Luftflotten and Fliegerkorps have their own signal regiments to lay the communications networks and erect and operate the wireless telegraph, visual beacons, etc., in their areas of operation. These regiments are formed of specialist companies. Each company deals with a specific aspect of signals work and has a number of self-contained specialist platoons. The regiments assigned to the Fliegerkorps supply the signal personnel which serve with Army Cooperation units. Some regiments also have signals aircraft (usually a Ju. 52 or Fieseler "Storch") with temporary serials which act as advance ground wireless telegraph and direction finder stations.

The Luftwaffe also have their own signal regiments for defense against aerial attack. These regiments are composed of companies which specialize in aircraft reporting and man the Observer Corps and radio direction finder posts.

There are two signal platoons at each operational airfield. One platoon belongs to the ad ministration of Luftwaffe organization of the airfield and operates the airfield telecommunications and exchanges, the wireless telegraph services, airfield ground to ground communications, and airfield safety services. The second platoon is attached to the combat or tactical

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unit stationed at the airdrôme. The personnel of this platoon is part of and moves with the combat unit and is responsible for all signals communications with the aircraft during operational flights.

A special signals unit is assigned to the Air Ministry, and one experimental air signals regiment (Lehrregiment) operates as part of the Lehrdivision.

(d) Air-Borne Forces. German air-borne forces consist of three types of troops:- parachute troops, glider-borne shock troops, and air-landing troops. Both the parachute and shock troops are specially trained G.A.F. personnel. Air-landing troops are regular infantry units drawn from the Army for a particular operation only and are not specially trained for air-landing. Only the parachute troops are dropped from a flying aircraft. The shock troops and air-landing troops are actually landed on the ground in their transport glider or aircraft.

Fliegerkorps XI controls all operations involving airborne forces. It is the senior command and draws the necessary combat elements from subordinate commands as follows:

Parachute troops from Fliegerdivision VII.
Shock troops from the Sturmregiment.
Air-landing troops from the Army.
Transport aircraft from Z.B.V. units.
Gliders from the Luftlandung Geschwader.

i. Parachute Troops.

The specially trained parachute troops are organized into a division known as Fliegerdivision VII. This Division consists of three Regiments plus medical and supply services and mortar, antiaircraft, demolition, and signal units. There are at least 18,000 to 20,000 fully trained and equipped German parachutists. Four parachute rifle regiments have been identified and another two are believed to be in existence.

Each Parachute Regiment is composed of a Headquarters and fourteen companies. Twelve of the companies are organized into three Battalions of four companies each. The thirteenth company is a Mountain Company with 75mm. guns, and the fourteenth is an Anti-Tank Company with 37 mm. guns and a Pioneer Platoon.

The first three companies of each Battalion number around 150 men each. They operate as Light Rifle companies with a Headquarters, a Signals Section, and three platoons. The fourth company of each Battalion is a Heavy Weapons company with 120 men and two platoons---anti-tank and light mortar.

The basic operational unit of parachute troops is a section of 12

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men armed with machine guns, rifles, and revolvers, or eight men with a heavy mortar. Three of these sections form the parachute platoon.

In addition to the specialized Fliegerdivision VII, an estimated 50,000 Army soldiers have completed a short course in parachute jumping with a minimum of six jumps. These soldiers are not organized as special parachute units, but return to their regular Army units after completing their training. The one exception is in Mountain Regiments, which have one company of trained parachutists in each Battalion.

ii. Glider-Borne Shock Troops. In late 1940 one Sturmregiment (Assault Regiment) of air-borne shock troops was organized. These troops are G.A.F. personnel chosen for their toughness and trained in particular shock tactics. They are transported to the point of operations in towed gliders. The Sturmregiment is organized on lines similar to those of a Parachute Regiment, i.e., into Battalions of four companies each with 120 men per company.

iii. Air-Landing Infantry. The German Army is not believed to have any units specially trained as air-landing infantry. Any Army unit may be moved by air into the theater of operations, air transport being merely an alternative to ground or water transport. A special divisional air-landing organization is evolved for each mission, and an Air-Landing Division will generally differ from a normal Infantry Division in the following respects:

Strength is 40 to 60 per cent of a normal Infantry Division.
Percentage of supporting weapons is smaller.
Heaviest artillery is a 75 mm. mountain gun.
Supply services are much reduced.
There are no transport vehicles.
Proportion of officers and N.C.O's is higher.

(e) Air Transport Services. German air transports are under the control of the High Command and are allocated to the various Luftflotten and Fliegerkorps as and when required. Almost all air transport is done by the Junkers Ju. 52 of which the Germans are estimated to have at least 1500. About 800 to 1000 of these are organized into Z.B.V. units and the Luftlandung Geschwader. The remainder are unattached.

i. Z.B.V. units. The Kampf Geschwader Zur Besonderer Verwendung ("for special duty"), or simply K.G.Z.B.V. units, are organized on lines similar to those of an operational Geschwader. Each Z.B.V. Geschwader consists of about 200 aircraft organized into four Gruppen of four Staffeln each. The Staffel complement is twelve aircraft organized into four Ketten of three aircraft each.

The organization of air transport units closely parallels that of parachute troops. A Ju. 52 can carry 10 to 12 fully equipped parachutists. Thus, one section of parachutists is carried by one aircraft; a Platoon of 36 men is carried by a Z.B.V. Kette; a Company of 120 to 144 men is carried by a Z.B.V. Staffel; and an entire Parachute Battalion is carried by a Z.B.V.

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Gruppe. Whenever possible, the men are moved by units; i.e., a Parachute Platoon in a Z.B.V. Kettner, with the aircraft flying together and dropping the parachutists in formation.

ii. Luftlandung Geschwader. At the same time that the glider-borne Sturmregiment was organized, a new air transport unit of Ju. 52's known as the Luftlandung Geschwader was organized. This Geschwader is organized on lines identical to those of the Z.B.V. Geschwader, except that each Ju. 52 tows one glider instead of transporting parachute troops. To date, the average glider capacity has been 10 men. Thus, an Assault Company of 120 men can be transported in 12 gliders towed by a Luftlandung Staffel of 12 aircraft, and so on through the Regiment.

(f) Services. The G.A.F. has its own specially trained Medical Corps, its air engineers, supply, and air supervision services.

(4) Army and Naval Cooperation.

(a) Army Cooperation.

i. Striking Forces. All air operations in the zone of land operations except Army tactical reconnaissance are controlled by the Air Corps Commander of that Air Fleet which is supporting the ground forces. Bomber striking forces with their own reconnaissance elements, and fighter operations (both over the battle area and lines of communication) are controlled by the same Air Force Commander. A very close liaison between Army and Air Forces both on and off the battlefield makes for a high degree of cooperation between the ground and air striking forces.

ii. Short Range Reconnaissance. For Army cooperation and tactical reconnaissance (visual and photographic), special G.A.F. squadrons known as (H) or Heer units are employed. One or more of these units, as required, are placed at the disposal of the Army Commanders. The units remain under the Air Forces for administrative purposes, drawing personnel and equipment from the G.A.F. command, but are operationally under the Commander of the Army to which they have been allotted for employment. There is no direct evidence that particular units are permanently reserved for the support of a specific Army.

Personnel of the (H) units are members of the G.A.F. Since the outbreak of war, all (H) unit observers have been trained volunteers from the Army who are posted to the Army Cooperation Base Depot and then officially seconded to the G.A.F. for four years or for the duration of hostilities.

iii. Long-Range Reconnaissance. Each Fliegerkorps has one or more Fern or (F) squadrons for long-range strategical reconnaissance. Each (F) unit is directly under the command

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of the Fliegerkorps concerned. They may do reconnaissance requested by Naval or Military authorities, but only with the express permission of the Fliegerkorps Command.

iv. Liaison. The liaison organization between Army and Air Forces falls into three types.

- aa. Each Army formation has attached to its staff a G.A.F. liaison officer known as a Koluf. This officer may range in rank from a Major to a Lieutenant General, depending upon whether the staff on which he sits represents only an Army corps or a group of Armies. He not only commands all G.A.F. units assigned to the Army (air transport and Flak as well as Heer units), but is the Army Commander's link with the Fliegerkorps Commander. The Koluf is thus responsible to his Army Commander for Army cooperation operations, and to his G.A.F. Commander for aircraft personnel and equipment. It is his duty to see that the Army requirements for air cooperation are met.
- bb. Specially selected G.A.F. junior officers, with small self-contained signal units, are detached from Air Corps Headquarters to Army formations, probably down to an Army Division. These officers act as "battle liaison" by reporting, through their reconnaissance flights, their own forward lines and enemy centers of resistance. They implement the joint plans of the Army and Air Force Commanders by calling on the Fliegerkorps Headquarters for any additional support necessary. This request can be made direct from air to ground.
- cc. For specific operations, a forward Division, usually armoured, may be in direct liaison with definite Air Force formations or vice versa. A special liaison staff is usually temporarily attached to the Army formation concerned for ground-to-air liaison.

(b) Naval Cooperation. The G.A.F. meets all naval and coastal air requirements through the Luftflotte operating in that area, including all coastal and carrier-borne aircraft. Naval requirements are met in a manner similar to Army requests, i.e., by allotting the required aircraft for both the general support of the Navy and for particular Naval operations. Aircraft thus allotted are under the command of an Air Force Commander, known as a Führer der Luft, who serves with the Navy.

9. Equipment.

a. Individual. Officers and non-commissioned officers are armed with automatic pistols. All other enlisted men, except medical troops, are armed with rifle and bayonet.

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b. Aircraft.

(1) Fighters - Single Engine.

(a) Focke-Wulf F.W. 190. This is a new single-seat, 14 cylinder, radial-engine fighter which came into service in increasing numbers during 1942. The aircraft resembles the American VULTEE "Vanguard" P48A and French Bloch 152. During most of 1942 the F.W. 190 was identified in operations chiefly in France and Norway.

(b) Focke-Wulf F.W. 198. This new twin-boom, pusher, single-seater fighter has not yet been identified in service and is unlikely to come into service in large numbers, if at all. It is believed to be experimental and there is some doubt as to whether its development will be continued.

(c) Heinkel He. 113. This is a development of the Heinkel He. 112. It is not in service in large numbers, nor are its numbers likely to increase. It was identified in operations on the Russian Front during early 1942.

(d) Messerschmitt Me. 109E. This aircraft has been the standard single-seat fighter of the G.A.F. since the beginning of the war, but has now been largely superseded as a fighter by the Me. 109F. A certain proportion of the G.A.F. will continue to be equipped with the "109E" during 1942 and 1943, but its numbers will decrease. Many will be used for advanced operational training and conversion into fighter-bombers. A few stationed in France are being used for photographic reconnaissance.

(e) Messerschmitt Me. 109F. This fighter is an improved version of the "109E" with a high-compression engine and heavier armament. The "F" type will form the equipment of the majority of single-seat, single-engine fighter squadrons during 1942 and part of 1943. The 109F-4, designed for the tropics and desert warfare, has an air-cleaner on the engine. The "New Series" is similar to the "109F-1", but has a more powerful engine and a higher wing-loading. The latter would probably lower the ceiling, but would improve performance at medium altitude and increase the speed to almost 400 m.p.h.

(f) Messerschmitt Me. 109G. A new Me. 109 made its appearance in the fall of 1942. This plane is reported to have radical changes over the 109F types. The wings are slightly larger and set farther back on the fuselage. A pressure cabin with a plexiglass roof is also fitted. The engine is believed to be a DB 603 of 1800 or more horsepower, with a ceiling of over 40,000 feet with an estimated speed of 410 m.p.h. at 22,000 feet.

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(g) General. A further increase in the speed, operational altitude, and service ceiling of German fighters is to be expected during the coming year. The G.A.F. is undoubtedly working on two distinct types of single-seat fighters, one to specialize at medium altitudes and the other at high altitudes. The former will have a short wing span and high wing-loading, with its best performance and maximum speed (around 400 m.p.h.) at 20,000 to 25,000 feet. The high-altitude machine will be a larger aircraft with a wing span of 35-40 feet and lower wing-loading. This would increase the ceiling over the short span machine and give best performance and maximum speed (exceeding 400 m.p.h.) at 20,000 to 35,000 feet with a service ceiling of 40,000 feet or over. The high-altitude type, being larger, might well be equipped with a sealed cabin and used to intercept sub-stratospheric bombers.

(2) Fighters - Twin Engine.

(a) Focke-Wulf F.W. 187. This aircraft is used in limited numbers, mainly as an operational trainer. The German technical press has inferred that the aircraft is operational, but none have yet been actually identified in operations.

(b) Junkers Ju. 88C/ This is a modification of the Ju. 88 bomber and is used mainly as a night fighter. It has no diving brakes, carries no external bomb load, and has a nose panelled with metal instead of perspox. It will remain in service throughout 1942.

(c) Messerschmitt Me. 110. This small, fast, long-range, two-seater Me. 110 is the standard G.A.F. twin-engine fighter. It is used both for day and night operations. It is able to fly with considerable overloads, having a special "blister" tank under the fuselage besides the two jettisonable wing tanks. Fuel may thus be jettisoned to lower the flying weight before going into action as a fighter. It can also be used as a low-attack bomber and will undoubtedly remain in service during 1942 and early 1943.

(d) General. Twin-engine fighters will continue to specialize as long-range and night fighters. The service ceiling will most probably be increased. A version with a sealed cabin for interception of high-altitude bombers may be introduced.

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55(3) Fighter-Bombers.

(a) Messerschmitt Me. 109. The Me. 109E and Me. 109F fighter-bombers are similar to the fighters except that one 550 lb. or four 110 lb. bombs are stowed externally instead of the jettisonable fuel tank. Many, if not all, of the Me. 109E's may gradually be converted from fighter to bombers, but the Me. 109F will probably be used only as a fighter throughout 1942.

(b) Messerschmitt Me. 110. The Me. 110 is reported to carry a maximum bomb load of 4,840 lbs. with a cruising range of 640 miles if it operates from prepared runways. There is no direct evidence that such loads have been used operationally, but current operational use with 2,200 lb. bombs will continue in 1942.

(c) Messerschmitt Me. 210. This new aircraft is somewhat similar to and probably a development of the Me. 110. It can be used as a long-range fighter, particularly for night fighting, but its primary operational use during the coming year will be as a bomber. Its bomb load, which is both internal and external, and range are both superior to that of the Me. 110. Dive brakes can be fitted. The Me. 210 became operational in the spring of 1942 and will continue in operations in increasing numbers.

(4) Dive-Bombers.

(a) Henschel Hs. 129. This is a new twin-engine dive-bomber and ground attack aircraft which will be coming into service in increasing numbers. There is evidence of heavy armament and an external bomb-carrier or carriers beneath the fuselage. It is heavily armored on the underside for attacks on armored ground targets.

(b) Junkers Ju. 87. This is the standard G.A.F. dive-bomber used in cooperation with land forces and for anti-shipping attacks. It will continue in service for some time. Little major modification in construction is expected, although reports have mentioned an improved type with retractable landing gear and use of assisted take-offs. It is undoubtedly being improved for more effective operations with heavy bomb loads -- probably with the new 2,200 lb. rocket bombs.

(5) Torpedo Bombers.

(a) Blohm & Voss BV 140. A very few BV 140's are still in service as mine-layers and torpedo-bombers. It has less powerful engines than the He. 115, but a slightly higher performance. No further development is likely, and it is expected to disappear entirely from first-line units by end of 1942.

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(b) Heinkel He. 115. This mine-laying, bomber, and torpedo seaplane has been used extensively by coastal units. Although it has remained in service in small numbers throughout 1942, it is considered to be obsolescent and no further development is expected.

(6) Medium and Heavy Bombers.

(a) Dornier Do. 217. This is the G.A.F.'s latest operational twin-engine bomber. Actually it is a scaled-up and improved Do. 17Z (now obsolescent) with superior performance and increased useful load. It can be used both as a level and dive-bomber, being fitted with a new type of umbrella dive-brake in the tail. The entire brake assembly can be jettisoned. Reports indicate that wing-dive-brakes may have been added, both to supplement and even replace the tail brakes. The version currently in service has a 14 cylinder radial engine, but an improved type with an 18-cylinder engine is under development. The "217" is appearing in service in increasing numbers, and many units now operating with the Heinkel He. 111 are expected to be gradually reequipped with the "217".

(b) Junkers Ju. 88. Over half of the German bomber force consists of Ju 88's. When first introduced in 1939, this aircraft was very advanced. It was designed originally as a long-range level bomber, but has been successfully modified for dive-bombing, carrying night fighting, ground attack, and assisted take-off devices. The increased wing span has offered new loading possibilities which have been subsequently explored. The "88" is expected to continue in service for another year at least.

(c) Heinkel He. 111. The He. 111 is now considered to have reached its load limits and may gradually be replaced by new types such as the Do. 217. It is still being used in considerable numbers—more He. 111's are being used in the G.A.F. bomber force at present than any other bomber type except the Ju. 88—and is expected to remain operational during the next year. High overloads have been obtained and assisted take-offs are used operationally. Large calibre bombs, mines, and externally-carried torpedoes can be fitted. Armor and armament were modified in early 1942, but it is unlikely that the aircraft will be further improved or fitted with a new type of engine since too many structural modifications would be involved.

(d) Focke-Wulf F.W. 200 Kurier. This is the military version of the civil transport, F.W. 200 Condor. Although the Kurier can be used as a level or torpedo bomber, its

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primary use is for shipping reconnaissance patrols and cooperation with U-boats.

The first Kuriers to be used operationally were converted commercial machines, slightly strengthened for mounting guns and stressed to withstand the more concentrated weight of bombs instead of freight and passengers. The newer Kurier is constructed specifically for military purposes. It has more powerful engines and some built-in modifications, such as bomb racks in the wings, manually operated gun turrets, and a gun tunnel beneath the fuselage. The over-loading remains a serious problem, however, despite the extensive restressing, and armor protection is particularly weak. Thus, the Kurier is still a vulnerable aircraft with a low safety factor. Nevertheless, it will remain in service and might even be improved, pending the introduction of newer types such as the He. 177.

- (e) Heinkel He. 177. This new German bomber is just becoming operational after several years of experimentation. Although it is intended primarily for long-range anti-blockade use, it will probably also be used for short and medium-range bombing and dive-bombing. It has two interesting features: (1) the unusual length of the nose forward of the fuselage, and (2) the mounting in each wing of two engines geared to one propeller shaft. The latter feature gives the aircraft the appearance of a twin-engine ship for identification purposes. Increased armor and armament are evident, with indications that the guns are of heavier caliber than the usual 7.9 mm. machine guns. Only a few He. 177's have appeared in operations thus far, but increasing numbers are expected during the coming months.
- (f) Junkers Ju. 89. This is the military version of the transport Ju. 90. Very few, if any, of the "89" have been identified in operations. In fact, reports as late as March, 1942, claim that the "89" was a specialized version and was not put into production.
- (g) Junkers Ju. 86P. The Junkers Ju. 86K was the standard German bomber from 1932-1936. It was obsolete as an operational aircraft soon after the war began, but continued in service as a communications and transport ship. (See Transports). In late 1941 two new versions of the Ju. 86 with an increased wing span were reported. These were designated as the Ju. 86P-1 and P-2. Both are designed for high-altitude, long-range operations and equipped with sealed pressure-cabins. The P-1 is intended primarily for bombing and the P-2 for reconnaissance.

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(h) Assisted Take-off. The G.A.F. has resorted to the assisted take-off method in order to utilize fully the carrying capacity of their bombers through over-loads. It is also used to overcome the limited size of some of their airdromes and is expected to become a standard installation on all types of bomb or load-carrying aircraft. There are three main types of assisted take-off equipment.

i. Catapult. This method is mainly used aboard ships where the take-off run is extremely short. The equipment is complicated and costly and is not likely to be used to any great extent in land operations.

ii. Winch. This appears to be the standard method of assisted take-off. The equipment consists of a powered winch or pulley arrangement which tows the aircraft along the runway with engines running at full power. The method is somewhat complicated, but most of the apparatus can be located underground and camouflaged. It is best adapted for established airports.

iii. Rocket. The rocket system is in general use in the G.A.F. and is probably the simplest and least expensive of the types in service, since no permanent ground installations are required. The rocket carriers are located under the wings near the engines and are fired electrically by the pilot. The rockets must be attached anew for each flight, and the empty carriers are then jettisoned after the plane is airborne. The carriers have parachute attachments which so retard the descent that the carrier lands in good shape and can normally be used over again.

(i) General. German bombers during the early part of the war relied on their superior speed and maneuverability to compensate for their lack of armor and armament. The policy appears to be changing now, and developments during the coming year will probably follow the technical principles evident in the Dornier Do. 217. Specific characteristics to be expected are as follows:

- i. Further development of armor protection.
- ii. Limited adoption of powered turrets and increased fire power. The Do. 217 is the first operational bomber to be fitted with a power-operated turret.
- iii. Reducing the number in each crew and so grouping them as to facilitate armoring and improve morale.

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iv. Ready adaptability for specialized duties such as dive-bombing, mine laying, and torpedo dropping.
v. Higher wing loadings of 50 lb./sq. ft. and over.
vi. Maximum speeds at medium altitudes - 16,000 to 20,000 feet.

vii. Adoption of air-cooled engines of advanced design.

These improvements, however, will still have attendant disadvantages, such as limited effectiveness of armament, low ceilings when fully loaded, and difficulty in operating fully loaded from small airdromes.

(7) Army Cooperation.

(a) Arado Ar. 196. The "196" with its folding wings is the standard catapult plane used aboard German warships. It is normally employed as a fighter, but has also been used for reconnaissance and light bombing. It may be equipped with either single or twin floats.

(b) Fieseler Fi.156 "Storch". This three-place, high-wing monoplane has an extremely low landing speed and can take off from very small areas. It is ideal for observation, communications, and other missions which entail operations from small and restricted areas, i.e., removal of the severely injured from the battle front to airdromes in the rear for transport to larger ambulance planes. The "Storch" is expected to remain in service throughout most of 1942.

(c) Henschel Hs.126. This two-place monoplane with its parasol wing is the standard army cooperation plane of the German Air Force. It can also be used as a glider tug, although it has not yet been identified in actual operations in this capacity. It will undoubtedly remain in service during most of 1943.

(d) Blohm & Voss B.V.141. This short-range reconnaissance monoplane has been outstanding because of its asymmetric design. The nacelle is offset in the starboard wing and the engine is fitted in a fuselage offset to port. To balance the offset nacelle and longer right wing, the right side of the tail plane is a mere stub as compared to its left counterpart. A limited number of B.V. 141's will appear in service during the coming months.

(e) Focke-Wulf F.W.189. This three-to-five-place twin-engine, twin-boom monoplane is a specialized short-range reconnaissance and observation plane. The crew is carried in the nacelle, most of which is made of glass and which affords excellent visibility. The plane, however, is underpowered, has a low performance, and is very vulnerable to attack. Although reports indicate that parts are almost exhausted and that there will be no reproductions, the F.W.189 is expected to appear in larger numbers in 1943.

(f) Messerschmitt Me.109 and Me.110. On occasion, the German Air Force has used these fighters for army cooperation, especially for photographic reconnaissance. Although they are not designed for this role, they will undoubtedly continue to be used for this purpose well into 1943.

(g) General. It thus appears that the German Air Force has developed no new army cooperation types with the exception of the B.V.141. In fact, as in the case of the Me.109 and Me.110, the Germans have had to make use of the other types for this purpose pending the introduction of newer types.

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60(8) Coastal Patrol.

(a) Blohm & Voss. B.V.138. This twin-boom, twin-rudder flying boat was primarily designed for long-range coastal reconnaissance. It can also carry bombs and torpedoes and has been used for freight transport and submarine supply. It is appearing in service in increasing numbers and is expected to continue in service well into 1943.

(b) Blohm & Voss. B.V.139. This large, twin-float seaplane was originally designed for Transatlantic Service. It has now been converted for long-range bombing and reconnaissance service with an increased cruising range of 3600 miles. It has also been adapted for tropical service, but further development is believed unlikely.

(c) Dornier Do.18. This twin-engine flying boat, as adapted for catapult use, has its two engines in tandem—the front a tractor, and the rear a pusher. Its primary function is long-range coastal reconnaissance, although it is occasionally used as a bomber. It is extensively employed and will continue in service during 1943.

(d) Dornier Do.24. This five or six-place flying boat with its parasol wing is used for open sea reconnaissance, communications, and sea rescue work. It can also be used as a bomber and will continue in service throughout 1943.

(e) Dornier Do.26. This flying boat, with each pair of its four engines mounted in tandem, is still efficient according to current standards. It is used for long-range reconnaissance and coastal patrol, and occasionally as a transport. Gun turrets were noted during the early part of 1942, but further development is unlikely. There are only a few in service at present, and there is no indication that its use will be continued after those become nonoperational.

(9) Obsolescent Combat Types. Aircraft listed here were all operational at one time, but have now been largely replaced by later models. Hence, most of the following are now used for operational training, or for nonoperational services. They do not form a part of the standard equipment of first-line units except for a few which have appeared in limited numbers in localized areas during 1942.

(a) Arado Ar.95. The Ar.95 has two versions--the Ar.95L for land operations and the Ar.95S equipped with floats for sea service. The latter can also be catapulted from ships. Both are used for short-range reconnaissance and torpedo bombing. They have now become obsolescent as combat aircraft, although a few are still in operation with one coastal unit.

(b) Dornier Do.17Z and Do.215. These bombers, known as the "Fliegende Bleistift" (Flying Pencil), had their maximum usefulness as combat types during 1940, when they were used for long-range bombing and reconnaissance. The superstructures were so shaped that additional fuel tanks, photographic instruments, and bomb racks could be rapidly installed and removed. The Do.215 was a development of the Do.17Z. The nose was redesigned, the structure strengthened, and more powerful engines were installed. Nevertheless, the Do.17Z remained in service longer and in larger numbers than the "215" and is only now becoming obsolescent. Its primary use in 1943 will be as an advanced operational trainer and for headquarter flights, i.e., Gruppen and Geschwader Stabs and Oberkommando

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der Luftwaffe. Combat units formerly equipped with the Do.17Z are now operating with Junkers Ju.88's.

(c) Heinkel He.114. A limited number of these float planes are in service for short-range reconnaissance and sea rescue service. A deck-landing version with wheels instead of floats was reported in late 1941, but development beyond this point is unlikely.

(d) Heinkel He.59. This twin-float biplane, although almost obsolete, is still being used in small numbers for coastal reconnaissance, mine laying, and torpedo and level-bombing. It is an extremely slow and vulnerable aircraft and its activities are becoming increasingly limited to sea rescue work and advanced training.

(e) Heinkel He.60. This two-place, twin-float biplane is used for reconnaissance, as a ship escort, and as an advanced trainer. This is also a slow, vulnerable craft, and although a few coastal units are still equipped with it, the He.60 is now considered to be almost obsolete.

(f) Henschel Hs.123. This single-seat biplane was used for dive-bombing, but has now been withdrawn from first-line units except for a few identified on the Russian front. It is currently being used for operational training and will probably be entirely withdrawn from operational use by 1943.

(10) Transport.

(a) Blohm & Voss B.V.142. This is a large land-plane which is a direct development of the B.V.139 seaplane. Its use in the G.A.F. has been confined to transport. Only a few of these machines have been produced and further development is unlikely.

(b) Blohm & Voss B.V.222. This six-engine, long-range flying boat is probably the largest aircraft, apart from gliders, produced in Germany during the past year. The engines have not yet been definitely identified. It is not believed to carry armament. Although its speed is low, it reportedly has a range of 4400 to 5600 miles with accommodations for 80 or more passengers. It is already in use in small numbers, and is expected to come into service in larger numbers during the coming months.

(c) Focke-Wulf 200 Condor. This is the civil version of the heavy bomber, the FW 200 Kurier. Many of the commercial versions used prior to the war have been converted into bombers, and the number of Condors remaining for military troop and freight transport is believed to be few.

(d) Heinkel He.116. This was developed several years before the war as a long-range transoceanic mail and freight carrier. A later version with a completely transparent nose has reportedly been developed for photographic service. A few He.116's will probably remain in service as transports until mid-1943 at least.

(e) Junkers Ju.52. This is the standard freight and troop-carrying aircraft of the G.A.F. The design is far from modern (the Ju.52 was in production as early as 1930), but it remains one of the most efficient cargo planes in operation. There is plenty of available freight space, and large doors and panels on the sides and top facilitate the loading of bulky stores. It is equally effective as a troop carrier; both regular and parachute troops can be carried with all equipment. The "52" has also been widely used as a glider tug, an ambulance plane, an advanced ground signal station, and a "flying classroom." It was also produced as a bomber in 1935.

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It is a relatively simple aircraft to produce and has been turned out in such large numbers during the past years that the number of available Ju.52's is well over a thousand. They will certainly remain in service for another year or more.

(f) Junkers Ju.252. This is a development of the Ju.52 and was first reported as a high-altitude bomber. Subsequent reports indicate that it will be used instead as a long-range transport. It is a considerable improvement over the "52", having a smooth skin instead of the usual corrugated covering, and will be equipped with more powerful radial engines. It is likely to appear in service in limited numbers during early 1943.

(g) Junkers Ju.86. This aircraft was introduced in 1936 as a high-performance passenger and freight carrier, having a capacity of 10 passengers. A bomber version was also used in the early months of the war -- in Poland in large numbers and on the Western Front -- but since then the Ju.86 has been used only for communications and transport with the exception of the new "86P". It is expected to remain in service at least during the early part of 1943.

(h) Junkers Ju.90. This aircraft was specifically designed and produced in 1937 as a commercial or military transport for heavy, bulky stores and passengers. It is now being used for military transport. Its freight capacity is normally 13,000 lbs., but can be increased to almost 20,000 lbs. when overloaded. As a troop transport the Ju.90 carries 40 fully equipped troops. With the internal equipment removed, it can carry three 3.5 ton tanks, two 5.7 ton tanks, or one 9 ton tank. It will remain in service well into 1943, but may be gradually superseded by the Ju.290.

A later version, the Ju.90-New, with a redesigned wing and tail assembly, was identified in operations in early 1942. It is believed that these changes were dictated by a demand for more rapid production of this type. It also appears likely that a new type of engine may be installed.

(i) Junkers Ju.290. This is believed to be a newer version of the Ju.90, possibly with a longer fuselage and more powerful engines. It is expected to come into service during early 1943.

(11) Charts of Characteristics and Performance. The following charts list the performance and characteristics of the various operational and obsolescent G.A.F. aircraft discussed above.

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GERMAN AIR FORCE STANDARD EQUIPMENT
SINGLE ENGINE FIGHTERS

Aircraft Manufacturer and Model	Engine * Model, & hp Rating	Weight (lbs) Empty	Weight (lbs) Gross	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Armament (calibre of guns in millimeters)	Bomb Load (lbs.)
Focke-Wulf F.W.190	B.M.W. 801D 1 x 1650 hp @ 2700 rpm @ 17,000'	?	7,000 to 9,500 (est.)	380 to 410 @ 20,000' (est.)	38,000	380	2 x 7.9 mg & 4 x 20 cannon	None
Focke-Wulf F.W.198	D.B. 601E 1 x 1375 hp @ 2500 rpm	4,700	7,200	370 @ 16,500'	35,000	590 @ 295 mph	4 x 7.9 mg & 2 x 20 cannon	None
Heinkel He.113	D.B. 603 1 x 1800 hp @ 2700 rpm @ 16,500'	?	6,460 (app.)	400 @ 19,500'	39,000	650	2 x 13 mg & 1 to 3 x 20 cannon	None
Messerschmitt Me.109E	D.B. 601A 1 x 1175 hp @ 2500 rpm.	3,970	5,588	360 @ 18,000'	36,000	540 @ 322 mph	4 x 7.9 mg or 2 x 7.9 mg & 2 x 20 cannon	None
Messerschmitt Me.109F-1 Series 2	D.B. 601N High Compression 1 x 1475 hp @ 2600 rpm	4,740	6,090	(est.) 370 @ 22,000'	37,000 to 38,000	360 @ 310 mph 800 W/overload 600 @ 262 mph W/overload	2 x 7.9 mg & 1 x 15 or 20 mm cannon	None
Messerschmitt Me.109F-4 "Trop."	D.B. 601E 1 x 1400 hp @ 2700 rpm @ 15,000'	4,740	6,090	380 @ 21,000'	36,000	370 @ normal 720-830 W/overload	2 x 7.9 mg & 1 x 15 or 20 cannon, or 2 x 7.9 mg & 2 x 20 cannon	None

*See note at end of charts.

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SINGLE ENGINE FIGHTERS

Aircraft Manufacturer and Model	Engine *	Weight (lbs)	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Armament (calibre of guns in millimeters)	Bomb Load (lbs)
Messerschmitt Me.109F New Series	D.B. 601E 1 x 1375 hp @ 2500 rpm @ 5800'	5,800 6,650	360 @ 23,000	38,000	?	2 or 4 x 7.9 mg & 1 x 15 or 20 cannon or 3 x 15 or 20 cannon	None

TWIN ENGINE FIGHTERS

Focke-Wulf F.W.187	D.B. 601N 2 x 1220 hp @ 2600 rpm	?	12,500	390 @ 19,000'	36,000	650 (est) 4 x 7.9 mg & 2 x 15 or 20 cannon	Light bombs carried externally
Focke-Wulf F.W.187	D.B. 603 2 x 1700 hp @ 2700 rpm @ 16,500'	?	14,000 (est.)	395 @ 18,000'	39,000 (approx.) 650 @ 250 mph	4 x 7.9 mg & 2 x 15 or 20 cannon	Light bombs carried externally
Junkers Ju.88C	Jumo 211 2 x 1400 hp	16,847	22,000	310 @ 16,000'	29,000 (max.) 16,980 normal	925 @ normal 2200 W/overload	6 x 7.9 mg & 1 or 2 x 20 cannon
Messerschmitt Me.110	D.B. 601N 2 x 1150 hp @ 2500 rpm @ 7,700'	7,700 to 9,900	13,800	365 @ 16,400' 390 @ 20,000'	31,500 285 mph	920 @ 285 mph	4 or 5 x 7.9 mg & 2 x 20 cannon

FIGHTER-BOMBER

Messerschmitt Me.109E	D.B. 601A 1 x 1175 hp @ 2500 rpm	4,180	5,588 normal 6,400 overload	340 @ 18,000' W/bombs 354 @ 12,000' W/no bombs	32,000 36,000 W/no bombs	355 36,000 W/no bombs	4 x 7.9 mg or 2 x 7.9 mg & 2 x 20 cannon	550
Messerschmitt Me.109F	D.B. 601N High Compression 1 x 1475 hp @ 2600 rpm	4,740	6,700 overload	350 @ 18,000'	33,000	340	2 x 7.9 mg & 1 x 15 or 20 cannon	550

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FIGHTER-BOMBER

Aircraft Manufacturer and Model	Engine * Model, & hp Rating	Weight (lbs.)	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Armament (calibre of guns in millimeters)	Bomb load (lbs.)
Messerschmitt Me.110	D.B. 601N 2 x 1150 hp @ 2500 rpm @ 7,700'	7,700 15,300 normal 20,500 overload	290 @ sea level 365 @ 16,400'	23,000 start 34,000 finish	565 normal 1200 W/overload	4 or 7 x 7.9 mg & 2 x 20 cannon	4,840
Messerschmitt Me.210	Jumo 211 or IMA improved 2 x 1400 hp or B.M.W.801 2 x 1650 hp	? 18,400 (est)	330 to 350 (est) @ 18,000' to 20,000'	32,000 to 37,000 (est)	480 to 565 (normal) 1230 W/overload	4 - 6 x 7.9 mg & 1 x 15 or 20 cannon	4,840

DIVE BOMBERS (**)

Henschel Hs.129	As-410 2 x 450 hp or Gnome-Rhone 14M-8 or 9 2 x 850 hp @ 4,900'	? 9,000 (est)	225 @ Sea level 240 @ 6,000'	?	?	2 - 1 x 7.9 mg & 2 x 20 cannon	4,400 to 4,840
Junkers Ju.87	Jumo 211-D 1 x 1050 hp	6,100 9,400 to 11,782	242 @ 13,800'	24,500	470 @ 160 mph W/1540 lbs. & 125 gal. fuel 1530 W/overload	5 x 7.9 mg & 1 x 20 cannon	990 normal 1540 max. or 1 x 2200 lb. rocket bomb

(**)The Ju.88 and Do.217 are also equipped for use as Dive Bombers

TORPEDO BOMBERS (***)

Blohm & Voss BV.140	B.M.W.132DC 2 x 880 hp	13,860 18,750	199	13,000	785 @ 180 mph (normal) 1550 max.	2 x 7.9 mg	1760 (Torpedo)
Heinkel He.115	B.M.W.132DC 2 x 880 hp	13,530 20,790	220	21,320	1300 to 1860 W/overload	2 x 7.9 mg & 1 x 20 cannon	2200 max. or torpedo

(***)These machines are now obsolescent, but a few will remain in service during early 1943.
Further development is unlikely.

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66LIGHT BOMBARDMENT
(WEIGHT EMPTY - UP TO 12,000 IBS.)

No standard type of this weight class. See Operational Trainers for obsolescent types in this class.

MEDIUM BOMBARDMENT
(WEIGHT EMPTY - 12,000 TO 20,000 IBS.)

Aircraft Manufacturer and Model	Engine * & hp Rating	Weight (lbs)	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Armament (calibre of guns in millimeters)	Bomb Load (lbs.)
Dornier Do.217E-1 (Also Dive Bomber)	B.M.W.801 2 x 1650 hp © 2700 rpm	16,800 normal 36,000 overload	33,500 290 W/bombs 320 W/no bombs @ 18,000'	21,000 @ start 30,000 @ finish	1010 normal 960 W/6100 lbs. 1 or 2 x 15 or 20 2150 cannon W/overload	5 to 9 x 7.9 mg & 1 or 2 x 15 or 20 cannon W/overload	4,400 normal 6,600 max. or 3 x 2200 lb. mines or 2 torpedoes
Heinkel He.111K	Jumo 211D 2 x 1200 hp @ 2400 rpm	14,400 (est.)	25,300 normal 31,000 overload	274 @ 13,000'	26,500 @ start 32,400 @ finish	2140 normal 2640 W/overload 1 or 2 x 20 load 1300 cannon W/6600 lbs.	4400 normal 6600 max. or 1 torpedo or mines
Junkers Ju.88 (Also Dive Bomber)	Jumo 211B 2 x 1200 hp @ 2400 rpm	16,874	24,000 normal 29,000 (max.)	225 W/bombs 310 W/no bombs @ 16,000'	19,000 @ start 29,000 @ finish	1500 © 266 mph 2230 W/ 1 x 20 cannon 1100 lbs. 710 W/6400 lbs. 3105 W/2200 lbs. W/overload	2200 to 4400 normal 6400 max.
Junkers Ju.288	Jumo 222 2 x 1700 hp @ 18,000' or B.M.W.801 2 x 1650 hp	?	40,000	320	?	No fixed guns	4400 normal 9600 max. (est.)

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HEAVY BOMBARDMENT (WEIGHT EMPTY - 20,000 LBS. AND OVER)									
Aircraft Manufacturer and Model	Engine * Model, & hp Rating	Weight (lbs.)	Maximum Speed (mph)	Service Ceiling (ft.)	Range at (miles)	Armament (calibre of guns in millimeters)	Bomb Load (lbs.)		
Focke-Wulf F.W.200K	Bramo 323 Fafnir Kurier 4 x 900 hp @ 2500 rpm @ Sea Level (Fully Supercharged)	24,860 Empty Gross 46,000	38,500 260 @ to 15,000'	27,400	2,700 @ 5 to 7 x 7.9 mg & 218 mph 1 x 20 cannon or 1/40 lbs. 3 to 6 x 7.9 mg & 1,100 3 x 20 cannon W/11,000 lbs.	normal	3,500 11,000 max. max.		
Heinkel He.177	D.B. 606 2 x 2300 hp (4 x 1150 hp mounted in pairs)	36,000 (est.)	67,000 19,000 ¹ V/bombs 340 V/no bombs	270 @ start 25,000 V/1000 lbs. 3200 V/2200 lbs. 1100 /15,500 lbs.	21,000 @ start 25,000 @ finish	4,000 @ 3 to 6 x 12.7 mg & 240 mph 1 x 15 or 20 cannon V/1000 lbs. 16,000 max. 3200 V/2200 lbs. 1100 or 8 tor- pedoes	13,200 normal 16,000 max. pedoes		
Junkers Ju.89	Jumo 211D 4 x 1200 hp @ 2400 rpm.	35,280	50,715 (est.) 270 @ 11,000 ¹	(est.) 34,000	1,490 2 x 7.9 mg & 2 cannon	8,000 normal 9,000 max. (est.)			
ARTY COOPERATION									
Arado Ar.196 (Shipboard Seaplane)	B.M.W.132K 1 x 950 hp	4,860 normal 8,200 overload	6,940 190 @ 7,000 ¹	21,500	350 normal 890 max.	3 x 7.9 mg & 2 x 20 cannon	220 normal 660 @ overload		
Blohm & Voss BV.141	Bramo 323 Fafnir 1 x 900 hp or B.M.W.801 1 x 1650 hp	?	?	?	?	?	1 or 2 x 7.9 mg	?	
Fieseler F.156 Storch	As 100 1 x 240 hp	1,896	2,800	110 @ sea level	17,060 280	None	None		
Focke-Wulf F.W.189	As 410 2 x 450 hp	5,920	7,500	218 @ 13,000 ¹	27,500 ?	4 x 7.9 mg & possibly 2 x 15 or 20 cannon	?		

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ARMY COOPERATION

Aircraft Manufacturer and Model	Engine * Model, & hp Rating	Weight (lbs.)	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Armament (calibre of guns in millimeters)	Bomb Load (lbs.)
Henschel Hs.126	Bramo 323 Pafnir 1 x 900 hp	4,510 7,250 max.	230 @ 15,000 @ start 30,000 @ finish	27,000 @ start 186 mph. 140 @ 190 mph W/220 lb. bombs	685 max. 640 @ 186 mph. 140 @ 190 mph W/220 lb. bombs	2 to 4 x 7.9 mg	220 normal 620 max.

PATROL

Blohm & Voss BV.138 Flying Boat	Jumo 205C Diesel 3 x 600 hp @ Sea level	17,820	26,200	171	16,000	1500 @ 146 mph	4 x 7.9 mg
Blohm & Voss BV.139 Seaplane	Jumo 205C Diesel 4 x 600 hp	23,000	38,500	196 to 215 Cata-pulted	12,000	3200 @ 130 mph W/1000 lbs.	4 x 7.9 mg 1000
Dornier Do.18K Flying Boat	Jumo 205C Diesel 2 x 600 hp Sea level	12,265	19,000 normal 22,000 overload	155	17,000	1680 normal 2 to 3 x 7.9 mg or 2900 @ 90 2 x 7.9 mg & mph 1 x 13 cannon 3,220 max.	None - normal 1,100 - max.
Dornier Do.24 Flying Boat	B.M.W.132DC 3 x 880 hp	17,000	30,800	210 @ 10,000 195 @ 5,900	17,390	2000 @ 160 3 x 7.9 mg. May mph 1470 W/ carry 1 x 20 1300 lbs. cannon 960 W/3300 lbs.	1,320 normal 3,300 max.
Dornier Do.26 Flying Boat	Jumo 205C Diesel 4 x 600 hp Sea level	22,450	44,090	208	19,680	5,600 W/1000 lbs.	3 x 7.9 mg. 2000 max.

OBSOLETE COMBAT TYPES

Arado Ar.95 Land Short Range Reconnaissance	B.M.W.132DC 1 x 880 hp @ 2450 rpm	4,983	7,260	191	26,200	800 @ 162 mph	2 x 7.9 mg	660 normal 1760 max.
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OBSCOLENT COMBAT TYPES

Aircraft Manufacturer and Model	Engine * Model, & hp Rating	Weight (lbs.) Empty	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Armament (calibre of guns in millimeters)	Bomb Load (lbs.)
Arado Ar.95 Sea Torpedo-Bomber Reconnaissance	B.M.W.132DC 1 x 880 hp @ 2450 rpm	5,600 7,850 to 8,900	180 @ 10,000'	19,750 142	720 @ 142 mph normal 1,115 max.	2 x 7.9 mg	660 normal 1100 max. or 1 torpedo 1760 lbs.
Dornier Do.215 Light Bomber	D.B. 601N 2 x 1150 hp	11,684	19,000	310 @ 13,000'	29,500	Normal 770 1300 @ 215 mph W/1100 lbs. (overload)	550 to 1100 normal 2200 max.
Dornier Do.17Z Light Bomber	Bramo 323 Fafnir 2 x 900 hp @ 2500 rpm	11,484	18,930 normal 19,500 overload	275 @ 15,000' 215 @ Sea level	29,600	750 W/2200 1bs. 1300 W/overload	1100 normal 2200 max.
Heinkel He.59 Float Plane Torpedo-Bomber Sea Rescue	B.M.W. VI 2 x 660 hp @ Sea level	13,700	19,845	140 @ Sea Level	10,500	480 to 1242 ?	2200 or 1 torpedo
Heinkel He.60 Reconnaissance Ship Escort	B.M.W. VI 1 x 750 hp	6,105	7,950	150	16,400	590 to 745 ?	?
Heinkel He.114 Float Plane Sea Rescue Reconnaissance	B.M.W.132DC 1 x 880 hp	5,148	9,900	210 to 23,000	15,500 W/300 lbs. 630-700 max. (est)	510 @ 174 mph 2 x 7.9 mg	220 normal 300 max.
Henschel Hs.123 Dive Bomber	B.M.W.132A 1 x 660 hp @ 2050 rpm @ 3000'	3,312	4,884 to 5,800	200 @ 3000'	27,500 400	2 to 4 x 7.9 mg	440 normal

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TRANSPORTS								
Aircraft Manufacturer and Model	Engine * Model, & hp Rating	Weight (lbs.)	Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Troops	Lod	Freight
Blohm & Voss BV.142	B.M.W.132H or 132DC 4 x 880 hp	? Empty Gross normal 73,640 (max.)	35,640 250	22,300 2734 @ 217 mph	?	20	4,000 lbs.	
Blohm & Voss BV.222	B.M.W.801 6 x 1650 hp	approx. 9,600	approx. 110,000 to 136,000 (max.)	200 @ 10,000'	?	4,400 to 5,600		
Heinkel He.116	HM 508B 4 x 225 hp @ 2790 rpm		250 est.	?	2,795	16	3,200 lbs. (est.)	
Junkers Ju.52/3m	B.M.W.132H 3 x 880 hp	15,400	23,200 normal 25,000 overload	205 @ 4,000' 160 @ Sea level	22,500 1120 overload	21 regular or 10 paratroops	8,000 lbs.	
Junkers Ju.252	D.B. 601N 3 x 1150 hp 16,000'		25,000 (est.)	255 @ 16,000' 218 @ 19,686'		73 regular		
Junkers Ju.86	B.M.W.132DC 2 x 880 hp	10,138	18,050	255 @ 8,500' 200 @ Sea Level	26,000 700 to 915	10	2,200 lbs.	
Junkers Ju.90 (new)	Jumo 211D 4 x 1050 hp @ 2300 rpm	(est.) 36,000	(est.) 58,500	(est.) 260 @ 15,000'	?	(est.) 1080 normal 1960 overload	40 (est.) 13,000 lbs.	

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TRANSPORTS								
Aircraft Manufacturer and Model	Engine *	Weight (lbs.)		Maximum Speed (mph)	Service Ceiling (ft.)	Range at Cruising (miles)	Troops	Load
		Empty	Gross					
Junkers Ju.90 (old)	B.M.W.132H 4 x 830 hp	35,200 to 58,000 max. 66,000	51,000 3,500' 230 @ 14,000'	218 @ 3,500' 230 @ 14,000'	18,000 1630 overload	810 normal 1630 overload	40	9,000 lbs.
Junkers Ju.90 Extra Lift Device	Jumo 211D 4 x 1050 hp @ 2300 rpm		67,000			950 normal 1960 overload		22,000 lbs.
Junkers Ju.290	B.M.W. 801 or Jumo 222 4 x 1650 hp							
F.W.-200B Condor	B.M.W.132DC 4 x 880 hp @ 2,450 rpm	24,660	38,500	260 @ 8500'	24,300	1,242 normal	30	6,000 lbs.

* Engines:

As - ARGUS (ARGUS MOTOREN GESELLSCHAFT) G.m.b.H.

B.M.W. - BAYERISCHE MOTOREN VERKE A.G.

Bramo - BRANDENBURGISCHE MOTORENWERKE G.m.b.H.

D.B. - DAIMLER-BENZ AKTIENGESELLSCHAFT.

HM - HIRTH-MOTOREN G.m.b.H.

Jumo - JUNKERS FLUGZEUG und MOTORENWERKE A.G.

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c. Gliders. The efficiency of transport planes has been further increased by the use of towed gliders. Beginning with the invasion of the Lowlands in 1940, the G.A.F. has used towed gliders for both troops and supplies.

Gliders have numerous advantages. Their approach is silent and they can use small landing areas. Equipment for a glider-borne unit can be landed already assembled with the unit instead of in containers. Thus, the speed of concentration of glider-borne troops after landing is far superior to that of parachutists who have to collect themselves and equipment.

Many different types and sizes of tow gliders have been tried by the Germans. Unlike the conventional soaring plane, tow gliders resemble a sturdily-built monoplane without the motor or conventional landing gear. Two wheels are usually used for take-off and are then either jettisoned or retracted into the fuselage after the craft is air-borne. The gliders then land on a spring-loaded central skid. German gliders are equipped with landing flaps and dive brakes to steepen the gliding angle. More recently they have also been fitted with navigation and landing lights for dawn, dusk, and night operations.

The principal types of German gliders as identified in current operations and by aerial photography are the following:

(1) D.F.S. 230. This glider is the standard troop-carrying glider of the G.A.F. It has a wing span of $71\frac{1}{2}$ feet and a normal load of ten men (including the pilot) with full battle equipment, including six rifles and one or two machine guns. Up to three of these gliders can be towed by a Ju.52, although only rarely is more than one towed at a time. This glider was used in the invasion of Crete, and is the principal type employed by the Luftlandung Geschwader.

(2) Gotha 242. This twin-boom glider with its useful load of 5,500 lbs. is the standard freight glider of the G.A.F. It can also carry 26 men and equipment (including a crew of two), or a small three-ton tank. The rear part of the fuselage is hinged at the top and can be opened to permit the loading of bulky objects. It is armed with machine guns, and armor has been found on the pilot's seat. Some versions are also equipped as powered gliders. These have two 500 h.p. Gnome-Rhone engines and are used as slow, low-altitude transports. This glider has been used extensively in the transport of supplies to Libya.

(3) Mersburg. This glider reportedly has a wing span of 175-180 feet, with a capacity of 40 to 50 men, a useful load of 20,000 pounds, or possibly a Pz Kw II tank. This glider has not yet been identified in operations.

(4) Goliath. This superglider is believed to have a wing span of about 270 feet and a twin fuselage. Each fuselage supposedly has a capacity of 70 men, giving the glider a total capacity of 140 men or 16 to 20 tons of freight. Little is known of this glider and it has not yet been identified in operations.

(5) M.D.R. 101. This glider has been reported as capable of carrying 10 men with full equipment and one infantry cannon, or 12 men with heavy machine guns. In cases of an emergency landing on water, it is expected to float about ten hours.

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d. Engines.(1) Engines in Service.

(a) Air-Cooled. There are two types of air-cooled service engines -- the inverted "Vee" and the radial. At least four types of radial air-cooled engines will be in service during 1943, two of which are single-row 9-cylinder and the remainder twin-row engines of 14 and 18 cylinders.

Aerus As.410. This 12-cylinder, air-cooled, inverted "Vee", supercharged engine is rated at 450 h.p. at take-off. It was designed for light communications aircraft and trainers, and is at present installed in the F.W. 189.

B.M.W.132. This 9-cylinder, air-cooled, radial, supercharged engine is used mainly on older and comparatively slow transport, seaplane, and army cooperation types. The various series of the B.M.W.132 have different rated altitudes. The older version is fitted with a carburetor, while the newest models have a "direct injection" system.

Braun-Fafnir 323. This 9-cylinder, radial, air-cooled engine is used in the Do. 17Z and in flying boats. There are two models; one is fully supercharged with a 900 h.p. take-off rating and the other is "moderately supercharged" with a 1000 h.p. take-off rating.

B.M.W.801. This new 14-cylinder, twin-row, air-cooled, radial engine is mounted in the Do. 217 and F.W. 190 and is expected to supplant the engines currently used in several other types. The present models are fitted with a single-stage, two-speed supercharger and direct fuel injection. The later versions, however, will probably have three-stage superchargers with intercoolers between stages. The power output has been raised from the original 1480 h.p. to approximately 1700 h.p. or more. Further improvements are likely to give this engine a take off rating of 2000 h.p. A novel feature of the engine is a multiblade, geared, cooling fan or blower mounted immediately behind the propeller. This fan is used primarily to cool the engines during taxiing and take-off.

B.M.W.802. This 18-cylinder, twin-row, air-cooled, supercharged, direct-fuel injection engine was originally rated at 1675 h.p., but is now rated at about 2000 h.p. It is expected eventually to have a take off rating of about 2500 h.p. While little is yet known of this engine, it undoubtedly will be equipped with a supercharger having at least three stages with inter-cooler induction coolers. It will also be fitted with a geared-up cooling fan similar to that in the B.M.W.801. It is expected that the B.M.W.802 will supersede the B.M.W.801 on the improved F.W.190 and other planes of the later types such as the Do.217, Me.210, and possibly the new Ju.90 transport.

(b) Liquid-Cooled. The German liquid-cooled engines generally used are the Daimler-Benz and Junkers Jumo engines.

D.B.601. This 12-cylinder, liquid-cooled, inverted "Vee" engine has an automatic-controlled, hydraulic-coupled supercharger and direct fuel injection. The "N" series version of this engine is an improvement over the DB. 601A and B, the chief difference being a higher compression ratio and increased power output. A later and improved version of the DB.601, the 601E, has a still higher power rating. The newer Daimler-Benz engines are also being fitted with four valves to improve intake and

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scavenging and further increase horsepower. It is now believed that the power output and altitude rating will be further increased and this engine redesigned for operation with a pressure-cooling system. The 601 type is at present installed on the majority of single and twin-engined fighters.

D.B.606. This 24-cylinder, liquid-cooled, twin-inverted engine consists of two D.B. 601 inverted "Vee" engines mounted side by side, driving a single propeller shaft through reduction gears. It develops 2460 h.p. at 18,000 feet and has been identified on the He.177.

Jumo 205. This is a 6-cylinder, vertical opposed-piston, compression-ignition, two-stroke engine. It was developed in 1929 and was the first successful opposed-piston type to be flown. Subsequent improvements have been incorporated in the later C, D, and E models. The engine now develops a maximum output of 700 h.p. at 2500 R.P.M.

Jumo 206. This is believed to be a scaled-up version of Jumo 205. Little is known of this engine, but it is believed to have a slightly higher power rating than the Jumo 205.

Jumo 207 and Jumo 208. These two engines are a development of the Jumo 205, a two-stroke, 6-cylinder opposed, compression-ignition engine. These engines have been considerably improved and are now fitted with Turbo-blowers. Their maximum power output is 1000 h.p. at 26,240 feet at 3,000 R.P.M.

Jumo 211. The basic design of this 12-cylinder engine is expected to remain the same, but a new supercharger with "induction air cooling" will possibly be incorporated during 1943. The "211" may be developed even further to compete with the improved D.B.601 types. A large number of older aircraft types which remain in service during 1943 will be equipped with this engine. The Jumo 211 series may be summarized as follows:

Series B & D: Mainly used in He.111 & Ju.88.

Series D & H: Similar to B & D but with modified fuel pump. Also used in He.111 & Ju.88.

Series F: Similar to D & H series, but with higher compression ratio and DWL shrouded-impeller type blower.

Series J: Similar to F, but fitted with an "induction air cooler" which will improve the power output under tropical conditions.

(2) Engines Coming into Service. The trends in German aeronautical engine development have been toward an increase in power at rated altitudes. The recent appearance of twin-row radial engines suggests that the G...F. is becoming increasingly interested in air-cooled engines. Recent developments in German aero engines indicate that improvements along the following lines will be forthcoming:

(a) Improved types of mechanical or exhaust-driven multi-speed and multistage superchargers employing as many as three stages of compression with "induction air coolers" or "intercoolers" between stages.

(b) Evaporative or compression cooling to further increase the efficiency of the latest types of liquid-cooled "Vee" and "X" type engines.

(c) Further development of multibank engines.

(d) Multiblade or blower-assisted cooling of air-cooled engines.

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Since "direct fuel injection" is now almost universally adopted in Germany, it is not believed that designers will revert to the former carburetor system.

Further developments may be expected on the two-stroke cycle electric-ignition engines. Heretofore, these engines have not been considered a success because of excessive fuel consumption for the power developed. However, with the use of "direct injection", designers will undoubtedly be able to overcome this difficulty.

Although not definitely reported, German designers are probably working on "jet propulsion", combining their data with that of the Italian Caproni Company to improve existing models.

The following engines are expected to appear in service in the near future.

Jumo 222. Little is known of this engine, but it is believed to be a 24-cylinder "X" type.

D.B.603. This is probably a scaled-up version of the D.B.601 type and at least one series of the type will probably be developed for high altitudes and equipped with either multistage superchargers or "Turbo-blowers". While rated with a maximum of 1800 h.p. at present, it is believed that a rating of 2200 h.p. will be achieved in the near future.

D.B.605. This new 24-cylinder "X" engine reportedly consists of two D.B. 601 "Vee" cylinder blocks mounted on a common crankcase with a single crankshaft. It will probably be fitted with a supercharger and "direct fuel injection" system and is expected to appear in some of the newer single and twin-engine fighters.

(3) Experimental Engines. Numerous reports give descriptions of various new types of engines under development. It is not expected that these engines will appear in early 1943 except in experimental aircraft.

B.M.W. is reportedly working on a liquid-cooled, 4-stroke cycle, radial, Diesel-type engine, developing from 650 to 1200 h.p. at unspecified altitudes. In view of the increase in power recently developed in gasoline engines, it is felt that this type of engine will only be suitable for transports or certain flying boats.

Daimler-Benz are also working on a Diesol-type engine, the D.B.607, which is expected to develop a maximum of approximately 1,000 h.p. at 20,000 feet. No further reports of progress on this engine have been received.

There is also an unconfirmed report of a 32-cylinder "double-X" engine, with the power not specified. It is believed that each bank will consist of 4 cylinders. The information appears to be derived from a recent patent specification. Further experiments are also being carried out with "multirow" radial engines.

Both Junkers and Daimler-Benz are attempting to produce high-powered units consisting of two "Vee" engines driving a common propeller shaft. These engines are believed to be the Jumo 212 and 213 and the D.B. 613. It is felt, however, that these models will be superseded by newer designs along the lines of the Jumo 222 or the D.B. 605.

It is believed that the B.M.W.803 may be a 4-row, 28-cylinder, liquid-cooled, radial engine with a multistage supercharger and direct

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probably
fuel injection. If it is liquid-cooled, it will use a pressure cooling system. A type of "evaporative cooling" may also be employed.

e. Armament. The Germans have concentrated on a relatively few types of machine guns and cannon, but have manufactured these on a large scale. Recently, however, they have added improved types with a higher rate of fire, larger caliber, and greater muzzle velocity. Other recent innovations are electro-magnetic cocking and firing and electric detonation. A 40 mm. cannon for a fixed or flexible mount is also rumored.

The most frequently used types of German armament are listed below. The standard armament of most German planes is the MG.15 and MG.17.

M.G.15: - a magazine-fed free or flexible gun of 7.92 mm. bore.

M.G.17: - a bolt-fed fixed 7.9 mm. gun which may be equipped with the electro-magnetic loading and firing device.

M.G.81: - a 13 mm. gun often found on fighters as a fixed gun, but also used as a flexible and free twin gun on turrets.

Oerlikon: - a 20 mm. cannon used with explosive shells as the standard fixed or engine gun on most fighters. It is also used on flexible mounts. Because of its slow rate of fire, it is expected to be replaced by a newer type of cannon.

The more recent types of armament as distinguished by a rapid rate of fire and high muzzle velocity are the following:

Rheinmetall-Borsig: - a fixed 7.9 mm. gun also adaptable to a flexible mount.

Rheinmetall-Soloturn: - a 13.2 mm. gun which is either fixed or free.

Rheinmetall 30 mm.: - a fixed gun firing explosive shells.

Mauser 131: - a 13 mm. gun usually mounted singly or as a twin gun on the turrets of the newer type bombers. It has an electro-magnetic firing and loading mechanism and may be equipped with an electric detonating device.

Mauser 151: - a cannon with either 15 or 20 mm. barrels which fire 800 to 900 explosive shells per minute. It is easily synchronized with the propeller by means of the electro-magnetic loading and firing mechanism. It is being used in increasing numbers.

M.C.101: - an experimental 20 mm. cannon of which little is known to date.

f. Sights.

(1) Gunsights. The Germans have not considered mechanical aiming devices as entirely satisfactory because of the high speed of modern aircraft. Thus, the "ring and bead" sights were retained for a considerable time after the beginning of the war. However, the "ring and bead" are now being used only as reserve or alternate sights and are being replaced in both free and fixed guns by the optical type "reflector" sights. The Rovi type optical sights are usually used on fixed guns. The EZ-Reflexvisor and the Rovi 25B are used on flexible guns.

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(2) Bombsights. The Germans are using gyroscopically stabilized Lotfe and Goetz bombsights.

The Lotfe sights are fully automatic. The earlier Lotfe B was not considered adaptable to high-altitude precision bombing of ground or moving targets. The later Lotfe C has improvements, but is still adversely affected by banked turns or roll oscillations.

The G.V.219 is an open bombsight which is normally employed for only one predetermined flying speed.

The EZ G-2 is semiautomatic and the bombs are released manually.

The Kuvit II is a drift sight used with a Lotfe sight for line control.

The I.V.R-I or B.Z.A-1 are complex mathematical calculators which give a visual indication of the correct moment of release. These sights as found on the Ju.88 are used both for level and dive bombing and are considered to be excellent.

g. Turrets. Until recently German turrets or cupolas have carried only one gun. These cupolas have been of two types. One was hand-operated with a counterbalancing device to alleviate strain on the gunner when moving the turret. The other was electrically operated with two motors -- one for horizontal movement and one for elevation. Apparently neither cupola was designed as a first line of defense. Both were relatively light and did not interrupt the plane's streamlining to any great degree.

A small modified version of the cupola has also been used for floor guns and top gun stations. This version is mounted on a swivelling ring which may be installed vertically, horizontally, or transversely. Floor gun mountings can be operated from either a prone or kneeling position with a 100-degree field of fire in both the horizontal and vertical.

Recently, however, improved turrets have been introduced in an increasing number of German types. The newer turrets are power-operated and fitted with twin guns of large caliber. Current examples are found in the Do.217 and He.177.

h. Armor. The armor plate usually found in German aircraft varies in thickness from 4 mm. to 12 mm., although heavier armor and laminated plates have also been found. The total weight of armor per plane varies from 75 lbs. in fighters to 700 lbs. or more in heavy bombers. During the past months armor has been used more generously and the thickness of the plates has been increased.

The crews are generally protected by armor. The pilot has a plate on his seat and another fitted to his back and curved over the top of his head. Gunners, bombardiers, and observers are normally protected by plates on the sides and floor of the plane.

Accessories are also protected in certain instances. Armor plate is mounted over engines and engine accessories. Bombers are usually protected against stern attacks, and in some cases armor has been noted on engine cowlings.

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i. Bombs, Mines and Torpedoes. German bombs range in weight from the small 4.4 lb. incendiary or demolition to the 6,600 lb. high explosive general-purpose type. While the 110 lb. and 550 lb. bombs are most frequently used at present, it is becoming increasingly evident that the trend is toward a heavier bomb.

The newest types of bombs are the 1,100 lb. armor-piercing bomb for use against shipping, and the 2,200 lb. rocket bomb. The latter is designed to achieve a more nearly vertical trajectory and greater penetration. A third type which may soon appear in use is the 5,500 lb. light-case bomb known as "Mizar".

Other types of bombs in current use are the following:

10 Kg. (22 lbs.) anti-personnel.
50 Kg. (110 lbs.) H.E. general purpose.
100 Kg. (220 lbs.) H.E. general purpose.
250 Kg. (550 lbs.) H.E. general purpose.
500 Kg. (1,100 lbs.) H.E. general purpose.
1,000 Kg. (2,200 lbs.) H.E. general purpose.
1,400 Kg. (3,080 lbs.) H.E. general purpose.
1,800 Kg. (3,960 lbs.) H.E. general purpose.
2 Kg. (44 lbs.) Incendiary.
9 Kg. (19.8 lbs.) Incendiary.
30 Kg. (66 lbs.) Incendiary.
10 Kg. (22 lbs.) Gas
Oil Bombs,
"Molotov Breadbaskets".

Parachute mines are being used against land as well as sea targets. A new type of magnetic parachute mine, with an overall weight of 2,150 pounds and beakled tail fins, has been designed primarily for use against dock-yards and harbor work.

The standard German aircraft torpedo is about 17 feet long and weighs approximately 1,630 lbs.

j. Parachute Troops.

(1) Individual. A German parachutist wears the same clothing as regular infantrymen except for a padded, narrow-brim steel helmet, grey-green overalls or tunic ending well above the knee, knee protectors, and special boots with thick rubber soles.

On his person he carries a machine pistol, gas mask, field glasses, pocket lamp, and Swastika flags. His sortie record is in his tunic pocket.

A pistol, ammunition pouches, haversack, carrying-frame, and rolled tent-canvas are carried on the belt.

In the trouser pockets are a jackknife, large field dressing, 10 rounds heavy pointed bullets, and decontamination material for arms.

A marching compass, small field dressing, four packets of pistol ammunition, and 10 rounds of pointed steel-case ammunition are carried in the combination pockets.

The haversack contains a full water bottle, cleaning apparatus, and iron rations. These rations consist of sausages, bacon, chocolate,

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bread, sherbet, dried fruit, and "Energen" or Vitamin C tablets. No other food or field kitchens are provided since parachutists are supposed to take over hotels and restaurants after landing.

(2) Containers. Equipment for each parachute section is dropped in containers which have a special marking for each section. Usually containers are carried in the troop-carrying aircraft and one container is dropped after every third parachutist. In some instances all containers are assembled and carried separately in one aircraft, usually a bomber, in which case the containers are designed for storage and release as bombs.

Containers may be either cylindrical or hexagonal. They are made of wood or metal. Most of them are fitted for mounting on wheels to give them ground mobility.

The principal weapons dropped in containers are antitank rifles, 2-inch and 3-inch mortars, and heavy and light machine guns. A 3-inch mountain gun is dropped in sections in three separate containers. Also dropped in containers are ammunition and miscellaneous stores such as pick-axes, spades, wire cutters, Bangalore torpedoes, smoke, stick and 626 grenades, bicycles, and wireless signalling sets.

k. Bases.

(1) Development. Germany started the war with some 120 operational airfields and an equal number of unattended landing fields. During the first year of the war there was extensive airfield construction, particularly between the Dutch and Danish frontiers. By February 1941, there were 383 permanent G...F. airfields and seaplane bases with complete facilities and equipment. One year later, March 1942, there were at least 570 airfields and landing fields in greater Germany.

Construction of air bases in occupied countries has also been extensive and there are now about 700 air bases in the occupied countries of Central and Western Europe. Norway now has an extensive system of over 70 bases, half of which are airfields and landing fields and the remainder seaplane stations and alighting areas. Denmark has some 40 air bases controlled by the Germans. In Holland there are 23 German airfields and landing fields and 3 seaplane stations. Belgium has 34 landing fields, 32 airfields and a seaplane station, although very few of these are in operational use at present. Occupied France has undergone the greatest development and now has about 500 bases available to the G...F. Of these, 47 are fully-equipped bomber airfields, 28 are permanent fighter airfields, and 9 are for bomber reconnaissance. The remaining 400 or more bases are landing grounds and emergency fields.

Airfields in Germany proper have now been almost entirely superseded as bases for offensive activity by those in occupied countries. A few bases in northwest Germany are used for night fighters, but the majority are used for supply bases for G...F. units stationed in forward areas and for flight training. In occupied areas, however, the primary function of airfields has been as a base for offensive activity over Britain, anti-shipping attacks, and reconnaissance. A few bases in occupied France are reserved for Erprobungsgruppen, but the majority are for operational units.

(2) Facilities. Airfields in Germany proper are usually located close to a branch of the main railway net and near settled communities.

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Most stations are equipped with perimeter lighting and Visual Lorenz. On the older airfields the hangars, barracks, bomb dumps, etc., are concentrated on the border of the field. On the newer airfields, however, bomb dumps are often some distance from the boundary and aircraft are widely dispersed in surrounding woods and on "satellite" fields. The number of personnel on a single airfield varies with the type and degree of activity. Generally, there are between 1,000 and 2,000 men, civilian and military, employed in an airfield area.

The outstanding characteristic of German airfields is the number and length of their runways. In 1940 very few G.A.F. airfields on the Western Front had more than one runway and only a few of these could accommodate modern bombers. Now, however, practically all bomber airfields have three runways averaging 1500 to 3000 yards in length with a landing ground of about 1400 x 1500 yards. Fighter airfields are smaller, long and narrow in shape, with an average landing area of 500 x 1100 yards. Fighter runways average 850 yards in length.

(3) Protection. The G.A.F. is protecting its aircraft by extensive systems of dispersal areas in woods around the airfields. Each Staffel has its own dispersal area with blast shelters for aircraft, small curved-roof hangars for repairs, and frequently its own bomb store. Since most airfields are designed to accommodate a Gruppe, there are generally three to four dispersal areas per airfield. Bomber dispersal areas are usually some distance from the airfield and connected thereto by concrete taxi tracks. Fighter aircraft are dispersed very close to the perimeter of the field, but are further protected by separate fields known as "stellits" or auxiliary airfields located near the main airfield.

All German airfields also have some form of Flak protection. Normally there is one battery of heavy guns and two to four batteries of light weapons, plus a varying allotment of small-caliber machine guns. This is increased at the more vital bases to two heavy and eight or nine light positions.

Camouflage is a further means to protection. Runways are darkened and field lines and patterns are painted on the ground. Buildings are camouflaged and nets are generously used to break shadows. Living accommodations and shops are disguised as farm buildings and situated among existing structures. Frequently an entire airfield is camouflaged as a country estate or large farm.

Dummy airfields and decoy aircraft have also helped protect German airfields. Dummy airfields are set up a few miles away from the real one and then provided with imitation runways, aircraft, and shelters, as well as night lighting systems. Dummy installations are usually made as identical as possible to those at the real airfield and the latter is then camouflaged.

10. Training Efficiency and Morale.

a. Training.*

(1) High Command. The system and general organization of G.A.F. training are the responsibility of the Training Inspectorate.

*Where recent information is lacking, the discussion is based on reports received prior to the war. It is possible that some of the training programs have been shortened because of wartime needs.

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The Inspectorate is headed by a general officer at the Air Ministry. Representatives of the executive body, known as the Higher Training Command, control training in each Luftgau and Luftflotte. Each Luftgau is responsible for the training within its own area.

(2) Preliminary Training. All students in educational institutions who are considered fit to become pilots are required to take a course in aeronautics. The Aeronautics Section of the Governmental Board of Physics Instruction promotes the study of aeronautics in German schools. Every higher institution of learning has at least one physics instructor specializing in aerodynamics. All 21 of the German technical institutes and universities have special aeronautical sections which offer courses in the theory and practice of glider flight.

The German Youth Organization has set up Model Airplane Working Communities where children between 12 and 14 years of age are instructed in building and flying model airplanes. In 1938 these Communities had about 90,000 members; in 1940 they had 500,000 members.

The Flying Hitler Youth Organization teaches glider flying to boys between 15 and 18 years of age. Instructors are men in the National Socialist Flying Corps. The Hitler Youth had a membership of 78,000 in 1938. Its size has since been greatly increased.

The National Socialist Flying Corps is composed of boys from the German Youth and Flying Hitler Youth Organizations. Membership is voluntary and classified according to age, fitness, future plans, etc. Boys who agree to enroll with the German Air Force receive instruction at a much lower rate. The N.S.F.C. had 52,000 members in 1938 and was operating 9 flying fields in 1939.

(3) Recruit Training. All men who join the G.A.F. spend their first four months in a recruit depot known as a Flieger Ausbildungs Regiment (Fl.A.R.) or Ersatz Battalion. Here they receive their initial training as soldiers and their preliminary mechanical training in Air Force specialties. Here also are selected the recruits best qualified for pilot training. Prior to the war the recruit course was shortened from twelve to five months and each battalion was graduating 1200 men every five months. Fourteen such battalions have been identified.

(4) Pilots. There are four air cadet schools - two in Berlin, one in Munich, and one in Dresden. Each school graduated about 500 cadets annually before the war.

Cadet training is divided into three periods. The first period is at the Recruit Depot or Fl.A.R. After completing this course, recruits go to a "pool" known as the Flug Auswarter Kompanie to await flight training. Here they continue physical training, military drill, and aviation studies. The usual time spent at the "pool" is two months, although the actual duration depends upon the rate at which the elementary flying schools can absorb new students.

The second period of cadet training lasts from three to six months. It is spent at elementary training schools where the cadets receive the so-called A/B training. "A" training consists of dual and a certain amount of solo flying. "B" training is on more advanced types of single-engine ships. Total flying time at A/B schools averages 100 hours.

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Bomber pilots receive their third period of training at Advanced Training Schools or "C" Schools. Here they receive three to six-months training on multiengine types. They then go to a blind flying school for six weeks' training with 15 to 20 hours of flying. Another period of three months is then spent at a bomber school for training with crews. The total bomber pilot training amounts to 18 to 23 months with some 220 to 270 hours of flying.

Fighter pilots go from the A/B school to a fighter school. The course here lasts three months with an average of 50 flying hours on types leading up to the Me.109. There is a special school between the A/B school and fighter school for twin-engine fighter pilots in which they familiarize themselves with twin-engine fighters.

Dive-bomber pilots go from the A/B school to a dive-bomber school for four months. Here the student practices 15 or more dives with an instructor and then dives alone.

Cadets have the status of enlisted men and are promoted to corporals six months after their admission to the G...F. They become sergeants after eight months of service.

One year after starting the course, the cadet (Fahnjunker) is promoted to ensign (Fahnrich). Six months later he may take an intermediate examination which, if passed, promotes him to an Oberfahnrich.

At any time during the two-year training period, cadets may be dropped if they do not show themselves as suitable officer material. Officer examinations are held at the end of the third period. Promotion from Oberfahnrich to Leutnant follows upon successful completion of the final examination and approval of the faculty of the Cadet School in the case of pilots, or the approval of the officer of the unit in which the cadet enlisted in the case of antiaircraft and air signal corps.

Upon graduation, the cadet has received from 150 to 200 hours of flight training. He can fly combat types and has a working knowledge of aircraft armament. He is then sent to an Operational Training School for further training on his particular aircraft type and to await posting to a combat unit.

After receiving his assignment to a combat unit, the pilot will usually go to a flying replacement group in the rear of the Geschwader. This group is known as the Reserve Training Unit (R.T.U.) or Ergänzungsgruppe. Here he is placed in a crew for final operational training under the control of the Geschwader and outside of the actual G...F. training organization. After one to six weeks in the Ergänzungsgruppe (according to the requirements of the operational unit), he is posted as a replacement in the Geschwader to which his group is attached. Sometimes, after being assigned to an operational unit, a pilot is sent back to the unit's reserve squadron for further training in the methods, tactics, and procedure peculiar to that unit.

(5) Crews. Sufficient schools have been established to insure an adequate supply of crews for the number of bomber pilots produced. Observers are trained in a 9 to 12-months course in navigation, photography, radio, gunnery, bombing, and tactics. The training for radio operators, air gunners, and mechanics is shorter than that for observers.

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(6) Specialized Schools. Specialized training for services allied to aviation is given in numerous schools. There are schools for Wear n Training, Dive Bombing, Wireless, Glider, Photography, Observation, Navigation, Bombing, and Parachute Operations.

(7) Selection of Enlisted Men as Officers. A method is provided by which exceptional soldiers lacking the educational qualifications required for normal acceptance as cadets may be given a cadet status and trained for commission after enlistment. This procedure is not the normal one. Soldiers transferred to a cadet status may not be over 25 years of age.

(8) Officers. Careers for officers in the German Air Force are in the Flying Corps, Air Force Engineers, Antiaircraft Artillery, Signal Corps, Air Medical Corps, and Air Infantry. The dissimilarity in these services accounts for the differences among branches in the systems for officer replacement.

In time of peace, officers are drawn from Officer Cadet Colleges. Courses last three years and include basic infantry, flying, and air tactics training.

During the present war, officer material is selected and trained from civil life or the ranks. Many men who have shown special aptitude for command have been selected directly from the ranks and commissioned after a very short orientation course. Training varies with the experience of the candidates.

(9) Reserve Officers. Reserve officers were being trained in 40 air force Flying Schools in 1938. These men were over 24 years of age and considered to be too old to enter the regular Air Force as pilots. At that time they were required to serve 60 days on active duty each year for three years. In July and August, 1939, 1000 reserve officers were called to active duty as flying instructors and 1300 inactive reserve officers were called to duty for refresher training to fit them for duty as flight instructors.

(10) Academies. The advanced schools for air officers are the Air General Staff Academy, Air Engineer Academy, and Advanced Air Force School. The three schools are combined into a single training center at Gatow near Berlin. Students are officers of about 30 years of age with the rank of captain.

All advanced school students must first pass the six months' course at the Advanced Air Force School. Those few who do not pass this course are returned to their organization without further training. Approximately two-thirds of the remainder go to the General Staff School and one-third to the Engineer Academy.

The General Staff Academy trains younger officers for higher command in the Air Force and for staff duties. It approximates a combination of our Air Corps Tactical School and the Command and General Staff School. The course lasts two years and, before the war, had an annual enrollment of about 100 students.

The Air Engineer Academy trains officer personnel to supervise the development of aircraft and accessories. The course lasts two years and approximates our courses at Wright Field. Graduates command and supervise only and do not become members of the Engineer Corps.

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(11) Antiaircraft Artillery and Signal Corps. Cadets in these two services are enrolled and receive the first part of their training in their respective combat units. Here they receive the basic training given all soldiers. During the second training period they are sent to primary flying schools for training as observers. The third period is similar to that of flying officers and is given at one of the four air cadet colleges and at the Air Signal School at Halle and the Antiaircraft Artillery School at Wustrow.

(12) Parachute Troops. Parachute-troop training is designed primarily to develop independence, particularly the use of initiative and self-reliance. Parachutists must be made to realize that they are independent fighters who must be on the "offensive" under any and all conditions, even when separated from their comrades and forced to rely on their own ingenuity.

A typical parachute-troop course lasts four weeks and includes six parachute jumps, the first at 800 ft. and the last at 250 ft. Instruction and practice in packing parachutes, instruction in foreign languages, map reading, cross-country running, and pack marches are also part of the course. This training is followed by several months of strenuous infantry training during which parachutists are trained to work in close cooperation with air-landing troops and to use a rifle, an automatic pistol, both light and heavy machine guns, and mortars.

(13) Air Infantry Training. The air training of these troops is limited to emplaning and deplaning.

(14) Glider Troops. Glider training is done under the National Socialist Flying Corps, first with sports gliders and later with heavy gliders and towed gliders. Training in night flight operations is also included. In addition to flight training there is a thorough study of glider construction, theory of flight, and elementary wireless telegraph.

(15) Naval Aviation. There are probably four naval (coastal) primary flying schools. Students then go to special schools for advanced naval flying or naval antiaircraft artillery.

(16) Engineering Corps. Candidates for the Engineering Corps must agree to serve 25 years; be no more than 22 years of age; have completed one-half year of labor service, one-half to one year in a technical establishment, and one year of active military service; and have a certificate of maturity for attendance at a technical high school. If a candidate withdraws before the course is completed, he is liable for the cost of the entire course.

Engineering training stresses airplane and machine construction and electrical engineering. In the first year of study, candidates are made active noncommissioned officers. By the time of their final examinations, they are regular active sergeants.

After final examination, engineering candidates are discharged as soldiers and appointed in a civil officer capacity as airplane constructors. The following three years are devoted to practical experience as engineers in the aircraft industry (18 to 24 months) and as troop engineers for troop groups (12 to 18 months). Candidates are eligible to take the second Engineering Corps examination and, if this is passed, may be appointed regular members of the Engineering Corps.

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(17) Air Medical Corps. Officer candidates of the Air Medical Corps are enrolled annually by Air Force units. Their first six months are spent obtaining basic infantry training at the unit with which they enrolled. The remaining six and one-half years are spent on medical training at the University of Berlin, on special instruction in military medicine, and in flying instruction.

(18) Administrative Schools. Regular training for a career in the Higher Technical Administrative Service of the Air Force requires three years. Training includes 14 months at one of the aircraft factories, a month at a school for employees in factories under the Air Ministry, 7 months on management of building operations, 5 months in the construction offices of the Air Force, 6 months in command of an Air District, and 3 months at the Administrative School of the Air Force.

(19) Schools for Enlisted Mechanics. Students spend their first 6 months studying all phases of airplane and motor maintenance. Practical work is done on the latest type of equipment. After this course students go to a squadron or to a 3-months course at an airplane motor or equipment factory.

Students who go to a squadron may be returned to the school for a 3-months specialized course, if, after 6 to 12 months with the squadron, they have shown special aptitude. At the end of this course they return to the squadrons as noncommissioned officers corresponding to the rank of corporal. After a year with the squadron in this grade they are eligible for another 3-months course; from which they emerge as sergeants. Specialists from factories are also eligible for the second 3-months course and rank of sergeant.

(20) Aircraft Factory Schools for Mechanics. About 16 of the leading engine and aircraft factories have established their own schools to train civilian apprentices as expert mechanics. Adjacent to the factories are Air Force schools for military apprentices.

Civilian apprentices receive up to two years of training, spend at least eight hours per week on theoretical studies, and must pass a written and oral examination before they can be employed as journeymen in the factory which trained them.

The military apprentice schools are called Air Technical Preliminary Schools. Here military apprentices undergo training similar to that of civilians, with additional training in rifle practice, map reading, etc. Military apprentices are trained to be noncommissioned officers.

Both civilian and military apprentices training are conducted by a Commissioner for Aircraft Industrial Personnel. Civilian apprentices are boys whose homes are near the factory, whereas military apprentices may come from anywhere in Germany. Military apprentices live in dormitories at the schools, have free board and clothing, and receive a little extra remuneration. However, military candidates must also agree to spend 12 years in the service after their four years of training. Most military apprentices are 14 or 15 years old when they start their training.

(21) Vocational Training Schools. Men who enlist for 12 years must attend an Air Corps vocational training school during the last two years of their enlistment. Attendance is compulsory. Schools are located

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in all Air Districts. Outgoing enlisted men are taught a vocation for civil life and are ensured a civil service position with the Air Force or employment in the aircraft industry.

(22) Air Raid Precautions School. The Air Raid Precautions School at Wannsee, just out of Potsdam on the road to Berlin, was opened on May 23, 1939. It is the principal training center of A.R.P. personnel; 800 additional A.R.P. schools are located throughout Germany.

b. Relative Ranks.

<u>U.S. Army Air Corps</u>	<u>German Air Force</u>
No equivalent	General_feldmarschall
General	General_leberst
Lieutenant General	General_der_Flieger
Major General	Generalleutnant
Brigadier General	Generalmajor
Colonel	Oberst
Lieutenant Colonel	Oberstleutnant
Major	Major
Captain	Hauptmann
Lieutenant	Oberleutnant
2nd Lieutenant	Leutnant

c. Pay and Entitlements. G.A.A.F. personnel receive three kinds of pay.

(1) Basic Pay (Gehalt). Basic pay in the G.A.A.F. is according to rank only. It is credited monthly in advance to each man's bank in Germany through the Luftwaffe organization. Deductions for taxes, insurance, etc., and additions for wife and children are made at the source. Pilots during their first year of training receive no Gehalt and must depend on their Wehrsold and a special cadet's pay (Michtgeld) of about one mark per day.

(2) War Service Pay (Wehrsold). This is paid to all married personnel, all flying personnel, personnel not serving at their peacetime station, and reserves called to active duty. Unlike the Gehalt, which is intended to meet home and family obligations, the Wehrsold is regarded as a personal allowance for officers and airmen. It is paid in advance every ten days by the unit in which the man is serving. It is received in cash and, in occupied territories, is converted into local currency.

Personnel in occupied countries receive a additional Wehrsold to meet the higher cost of living. The 1941 increase in France, Holland and Norway was 20%, 30%, and 50% respectively. Extra daily pay for service in Africa has been two marks for enlisted men, three marks for noncommissioned officers, and four marks for officers.

(3) Flying Pay (Fliegerzulage). Flying pay is for qualified G.A.A.F. personnel only and varies with rank and the amount of hazard in a man's flying job. There are four different scales of monthly flight pay as follows:

(a) Test Group, composed of test pilots, blind-flying instructors, and all flying personnel of the G.A.A.F. Testing Section: 160 marks for all ranks.

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(b) Combat Group composed of all flying personnel of combat units:

120 marks for officers and 60 to 100 marks for noncommissioned officers.

(c) Training Group composed of personnel retained as flying instructors, etc., who are fully trained and employed by staffs higher than squadron staffs:

70 marks for officers and 40 to 60 marks for noncommissioned officers.

(d) Special Group composed of technical personnel, such as airplane mechanics, who fly periodically:

45 marks for officers and 25 to 40 marks for noncommissioned officers.

(4) Other allowances. Officers on detached duty at the Reichsluftfahrtministerium receive a special allowance of 70 marks per month instead of flying pay.

Ground staffs of units which are making war flights receive an "Active Service" pay which is less than flying pay. Those of the Ground Staff who carry particular responsibilities receive a larger "Efficiency Pay" of about 30 marks per month instead of "Active Service" pay.

A uniform allowance of 30 marks per month is granted to officers for uniform keep. A newly commissioned officer receives an allowance of some 350 marks for his uniform.

G.A.F. Reserves on active duty receive the following pay:

Officers, all ranks -110 marks per month.

Sergeant Major -90 marks per month.

Sergeants -70 marks per month.

Corporals and privates-50 marks per month.

d. Efficiency. The individual ability of German pilots should never be underrated. They are cool, calculating, dominated by a will to win, and possess a high degree of confidence. They lack the dash and daring of British pilots and usually attack only when they have the advantage. To them, war is a desperate business and not a game where unnecessary chances are taken. Germany has many thousands of pilots, but it is believed there is a shortage of experienced pilots and crews trained for combat operations. The lack of trained pilots and crews could well become the "bottleneck" of the German Air Force.

e. Morale. Morale is generally high in the G.A.F. It fluctuates, of course, with the course of the war, but the men have great faith in their aircraft and airmen. Homesickness appears to be the only real problem. More and more, however, members of the G.A.F. are coming to recognize the extent of their losses and to realize that it will be a long war despite the Führer's promises.

11. Mobilization Plans. The methods of recruiting G.A.F. personnel are the following:

c. Active Officers. In time of peace officers are obtained from

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Officer Cadet Colleges. During the present war officers are selected from civil life and from the ranks.

b. Reserve Officers. The system of procurement is, in general, the same as that used in the army.

c. Men. Enlisted personnel for the active air Force is recruited by voluntary enlistment. Flying personnel enlist for four and a half years. All others enlist for two years.

12. Aircraft Industry. The main German aeronautical designing firms are Dornier, Focke-Wulf, Heinkel, Junkers, and Messerschmitt. Arado, Blohm and Voss, and Henschel produce operational types but on a much smaller scale. In addition there are several subsidiary companies building planes under licenses from the main designing firms, e.g., A.E.G., A.T.G., Ago, Erle, Fieseler, Mias, Siebel, and Weser. Training aircraft are designed and produced by Gotha, Klemm, and Siebel.

High-powered engines are designed by Bayerische Motorenwerke, Daimler-Benz and Junkers Motorenwerke. Argus and Hirth take care of medium and low-powered engines. All other engine firms produce under licenses from these five designers.

The German aircraft industry is entirely state-controlled and partially state-owned. The Air Ministry provides the specifications for new types for the main designing firms. After designs are completed, two or three prototypes are produced. The prototypes are then sent to the Air Force Center at Rechlin for technical tests and thence to a Lehr unit for tactical trials. After the final type is chosen, the competitive prototypes are either discarded completely or occasionally produced for foreign sale.

The three main centers of the German aircraft industry are still on the Baltic Coast in the North; around Berlin, Dessau, and Leipzig in the center; and around Munich, Friedrichshafen, and Stuttgart in the South. However, an eastward shift in the industry's center of gravity appears increasingly evident. Reports and aerial photography show new aircraft and engine factories going up in Pomerania, Poland, Czechoslovakia, and Austria.

Germany's aircraft industry seems to have been organized for an overall production capacity of about 6000 aircraft monthly, including training and transport aircraft. The highest rate of monthly production achieved to date is believed to have been around 3300 aircraft in June of 1941, of which about 70% were combat aircraft.

At present, Germany probably has sufficient raw materials and plant facilities to produce all the aircraft she currently requires. However, there is considerable evidence that labor and transportation difficulties have seriously limited present production. Production in August of 1942 may have reached a level of 2300 combat aircraft, but reports of early fall production indicate a sharp falling off, possibly to a level as low as 1250 aircraft monthly.

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13. Theory of Combat. The German doctrine of air warfare is based on a "separate" rather than an "independent" Air Force. The G.A.F. is designed for the closest kind of combat cooperation with the Army and Navy, but at the same time is organized and administered apart from either. Thus, to quote the Supreme General Staff, "The Air Force is an independent arm, is not called upon to conduct an independent war apart from the Army and Navy... The Air Force, Army and Navy form a single unit within the framework of the conduct of a total war."

a. Operational Units. German combat aircraft are designed for a variety of operations as follows:

(1) Lone-Range Bombing. The German Air Force has apparently discarded its policy of large-scale bombings over Britain for the time being. Large-scale daylight raids have not been employed over Britain since late 1940. Large-scale night bombings still occur, but are decreasing in number and severity. Only a few night raids have been undertaken during the past months, namely the Braecker, Birmingham and Canterbury raids, and even these are largely undertaken in reprisal for R.A.F. attacks. The mass attacks which do occur are against industrial and general areas rather than a particular works or factory.

Since the spring of 1942 the most successful bombing operations over Britain have been low-level "pirate" attacks by single aircraft with experienced crews. Prisoners of war report that suitable targets for these raids are selected several weeks in advance. Careful preparations are made with considerable attention to choice of routes, particularly to avoid hills and other obstructions. Several different targets are selected, each to be attacked by an individual aircraft on the same day. When the selected target cannot be located--as is often the case even with experienced crews--the best target in view is attacked. Approach is generally under cloud cover. The actual attack is usually level "stick" bombing, but bombs are occasionally dropped in shallow dive or a glide.

Level bombing is also being used against shipping. These attacks are usually made at low altitudes at dusk. Aircraft use cloud cover whenever possible, breaking cloud near the ship. Land is used as a background in the absence of cloud cover. Boom attacks are the normal practice for unescorted ships. For convoy attacks the preferred approach is along the length of ships or from the quarter.

(2) Dive Bombing. German dive bombers are designed for operations which require the greatest possible accuracy of aim. One of the most important uses is for the close support of ground troops to strike the first heavy blows at troop columns, lines of communication, road crossings, bunkers, tanks, forts, bridges, etc. Dive bombing is also used successfully against enemy airfields (especially buildings and hangars), shipping, ports and harbors, and small industrial or concentrated targets.

The usual dive bombing formation is a Gruppe of 30 to 40 aircraft with a single or twin-engine fighter escort. An individual objective is generally assigned to each pilot. Targets are usually relatively near (100 miles or less) from the base airport, since the dive bomber rarely operates outside the range of its fighter protection. The Ju.87 dives at 70 to 80 degrees and the Ju.88 at 50 to 60 degrees. The normal rate of dive is 335 m.p.h. with dive brakes lowered or 370 m.p.h. without brakes.

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(3) Aerial Torpedo Bombing. At the beginning of the war G.A.F. coastal units were organized and equipped for antishipping torpedo operations. However, these operations were subordinated to coastal reconnaissance and became increasingly limited in 1940. In 1941 the G.A.F. began equipping landplanes for torpedo carrying and started an expansion in the German aerial torpedo force and the pilot training program. A further increase in aerial torpedo attacks is to be expected during 1943 in view of the intensive training and development in equipment and tactics now underway.

Torpedo attacks usually occur at dawn or dusk. Attacks were originally made by single aircraft operating alone. More recently, several aircraft have been attacking together. It is now believed that the major trend in torpedo bombing is the use of mass attacks in formation, especially on convoys and escorted capital ships, on the theory that if enough torpedoes are released at one time, some are bound to strike home. Units are being taught to approach their target at sea level and rise to 150 feet for the actual release. Most attacks are delivered in a steady level approach from the beam or broad on the bow.

Aerial torpedo attacks are also being used in conjunction with level and dive bombers. These combined attacks are carefully synchronized. The dive bombers precede the torpedo planes by one minute in an attempt to confuse and distract the ship defenses. A Gruppe of torpedo planes then attacks in two waves, the second wave following two minutes after the first.

(4) Fighters. The great versatility of performance for which German fighters have become well-known is made possible largely by the G.A.F. fighter equipment. Both single- or twin-engine fighters can be used as straight day or night fighters; can be equipped with auxiliary tanks for long-range operations; can be fitted with cameras in place of armament for photographic reconnaissance; or can be modified as fighter-bombers for dive or level bombing and ground attacks.

German fighters have time and again been used to seize and maintain air superiority over a certain area by overcoming enemy bomber and fighter formations. No less important is their use as bomber escort, both as a direct escort in the immediate vicinity of the bombers, and as a distant escort at a thousand or more feet above and/or behind the bombers.

Fighter bombers are used for ground strafing and bombing airdromes, ground convoys, railheads, mechanized troops, etc., as demonstrated in Libya in mid-1942. Fighter bombers are also used against shipping and for small, sporadic bombing operations. These latter are conducted primarily for their nuisance value and constituted over half of the low-level day attacks on Britain during the first part of 1942.

The G.A.F. has used standing fighter patrols both offensively and defensively. As used over Malta in conjunction with the mass bombings in the spring of 1942, the fighter patrol not only protected the raiding German bombers, but prevented British planes from reconnoitering and attacking Axis airdromes and convoys. Fighter patrols as employed during mid-1942 in France, the Lowlands, and Northwest Germany were responsible for the defense of German airdromes and approaches to the inland industrial areas.

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The normal tactical unit for German fighters is the Rotten of two aircraft. At present it is the practice to fly in a Schwarm of two Rotte, maintaining a very close formation. Night fighters on the Western Front (excepting Norway) are controlled by the Ground Control Interception Stations' Freya radio direction finder and radio telegraph. Recent evidence also indicates that German night fighters are being equipped with some form of short-range aircraft interception device.

(5) Reconnaissance. The G.A.F. has made the greatest possible use of its reconnaissance aircraft. In fact, the rapid success of most German land operations would have been impossible if every enemy movement had not been observed from the air. Most of the short-range tactical reconnaissance is accomplished by Army Cooperation or Heer units equipped with slow Hs.126's for artillery spotting, and by fighters modified for photographic reconnaissance. Reconnaissance bombers do the long-range strategical reconnaissance and reconnaissance preceding and following bomber missions. These reconnaissance bombers are essentially unarmored long-range bombers modified for camera installations. In the fall of 1942, a new high-altitude reconnaissance bomber was introduced for operations well over 40,000 feet.

Armed reconnaissance against shipping was introduced during the spring of 1940 and has assumed an increasingly important role in the attempt to make the German air blockade of the northeast Atlantic really effective. Armored long-range bombers not only reconnoiter enemy shipping, but also take offensive action against the shipping itself. These reconnaissance bombers also report on meteorological conditions over the Atlantic and North Sea.

b. Air-Borne Troops. German parachute and glider-borne troops were used as early as May 1940, in the Flanders Campaign. Parachutists were used again in April 1941, on the Isthmus of Corinth. But the German attack on Crete in May 1941, was the first air-borne invasion and capture of strongly defended enemy territory across a body of water. It also defined the German theory of air-borne combat.

(1) Air-borne attacks are preceded by short, intensive low-level bombing, dive bombing and machine gunning of anti-aircraft guns, airbase defenses, and troop positions. This action ceases in areas selected for the descent of air-borne troops as soon as the troops arrive, but continues in areas surrounding the objective.

(2) Glider-borne shock troops are sent in first to disrupt communications and silence batteries and antiaircraft positions in preparation for the landing of parachutists. In Crete the gliders preceded the parachutists by 15 minutes. Shock troops normally work in companies. They are able to go into action almost immediately since they carry their arms with them and do not become dispersed in landing.

(3) Parachute troops are next dropped to capture an airbase or landing ground in preparation for the air-landing troops. Parachutists are dropped in depth around any area selected for attack instead of on the site itself. Parachute troop transports fly in a Kette of three aircraft and release troops from 300 to 500 feet. Descents are usually made at several points from one to twenty miles apart. The time for descent averages ten seconds with another ten to fifteen minutes for the troops to collect equipment and assemble for action.

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Companies promptly contact their battalions and regiments and then operate as a normal infantry unit. In Crete the parachute troops were dropped at a density of one battalion per square mile during the first day of attack.

(4) Air-Landing Troops are landed as near as possible to their final objective. Their first move is to contact and reinforce the parachute and shock troops. The command is then taken over by commanders of the air-landing army units, and the entire air-borne force sets out on the following missions:

- To block the approach of enemy reserves.
- To attack defenses from the rear.
- To seize and clear a harboring area for armored formations.
- To draw off reserves and create general confusion as a feint.

Although they are usually landed on a captured airbase, air-landing troops may be expected to descend on any reasonably flat area within three miles of the objective. The infantry and engineers are usually landed first and the heavier units with the antitank and antiaircraft guns follow.

The Germans have also used parachutists in conjunction with a land offensive. Anywhere from a platoon to a battalion of parachute troops are landed behind enemy lines to disrupt communications and seize key points such as railroads, roadheads, bridges, power stations, ammunition dumps, etc. They also do a good deal of sabotage and other fifth-column activity. Parachutists employed on these missions are expected to hold their positions for a few hours only--or a day at the most -- before they are relieved by their advancing ground forces. This technique has been demonstrated in Russia where parachutists have been dropped five to fifteen miles in advance of oncoming tanks to entrench in a village or hilltop and prepare the way for armored units.

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IV. NAVY.

14. Strength. a. Personnel. The strength of the Navy at this time is estimated at around 365,000 men and 12,000 officers.

b. Ships. Total effective completed tonnage: 173,267 tons; total building or appropriated for: 276,069 tons (excluding minesweepers and smaller craft).

(1) In Commission:

- 1 Battleship (40,000 tons, 38 cm. guns, 30 knots, completed 1941) (TIRPITZ).
- 2 Battleships (26,000 tons each, 28 cm. guns, 29 knots, completed 1938) (SCHARNHORST, GNEISENAU).
- 2 Armored Ships (10,000 tons each, 28 cm. guns, 28 knots, post-war construction) (SCHEER, LÜTZOW).
- 2 Old Battleships (obsolete, pre-war construction, 28 cm. short guns - for training purposes only) (SCHLESWIG-HOLSTEIN, SCHLESIEN).
- 3 Heavy Cruisers (10,000 tons each, 20.3 cm. guns, 32 knots) (PRINZ EUGEN, HIPPER, SEYDLITZ - fitting out).
- 4 Light Cruisers (post-war construction, 15 cm. guns) (KÖLN, LEIPZIG, NÜRNBERG, EMDEN).
- 18 Destroyers (new, 12.7 cm. guns).
- 34 Torpedo Boats (19 post-war construction).
- 360 Submarines (1,500 ton, 1,000 ton, 750 ton, 500 ton, and 300 ton types. The 500 ton type predominates).
- 5 Escort Vessels (new, fast minesweepers and anti-submarine vessels).
- 300 ~ 500 Assorted Vessels (minesweepers, tenders, patrol boats, training ships, motor torpedo-boats, etc.).

(2) Ships Under Construction or Appropriated for in 1938:

- 2 Battleships (45,000 tons, 40.5 cm. guns, laid down in 1939, doubtful whether work is being continued on these ships).
- 2 Aircraft Carriers (19,250 tons each, 15 cm. guns, 40 planes each, 32 knots; both laid down in 1936, 1 launched; doubtful whether work is being continued on the other).
- 7 Light Cruisers - including 2 Dutch and 1 French (laid down 1936; 4 of 7,300 tons each, 15 cm. guns, to be laid down; doubtful if work is proceeding).
- 26 Destroyers (12 of which are 1,811 tons, 12.7 cm. guns, laid down and launched).
- 11 or more Torpedo-Boats (600 tons each, 10.5 cm. guns, laid down and appropriated for).

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(Estimated) 225 Submarines (1,500 ton, 1,000 ton, 750 ton, 500 ton, and 300 ton types in various stages of construction).
100 plus Assorted Vessels (Minesweepers, tenders, patrol boats, training ships, motor torpedo-boats, etc.).

15. Organization. a. The entire German war machine is headed by Hitler, who is his own Minister of War as well as Fuehrer and Reich Chancellor. Under Hitler is the Supreme Command of the Armed Forces (OKW) which is a unified war ministry concerned with problems of grand strategy and with the coordination of the activities of Germany's three military branches: Navy, Army, and the Air Force. Chief of the OKW is General Field Marshal Keitel, who serves as Hitler's Deputy Minister of War.

The Supreme Operational Command and administrative authority of the German Navy are vested in the person of the Commander-in-Chief of the Navy, Grand Admiral Raeder. Immediately under Raeder's orders are:

(1) The "Supreme Command of the Navy" (Oberkommando der Kriegsmarine, OKM), which is the Navy's administrative branch and the equivalent of our Navy Department;

(2) The Group Commander North and the Group Commander West who, under Raeder and the Naval Command Office, are responsible for operations.

b. Supreme Command of the Navy. The Supreme Command of the Navy is composed of eight main divisions. Its organization is detailed in the chart attached hereto. (Page 98)

(1) The first of these divisions is the Staff of the Commander-in-Chief. Save that it operates as a staff rather than as an advisory body, it resembles the General Board of the United States Navy. It includes a Chief of Staff's Office under which is a General Division. Attached are the Military Section for Navy Engineering, a Naval Medical Section, a Naval Budget Group, a Naval Conference Group, and a Naval Strategy Section.

(2) The Naval Personnel Division, the next main division, was established in 1936 and at that time dealt only with commissioned personnel. Whether its functions have expanded since that time is not known.

(3) The Naval Command Office may be compared to our Operations Office. It includes Operations, Naval Organization, Naval Intelligence and Naval Communications, Naval Education and Training. In 1938 Naval Intelligence was transferred from the Commander-in-Chief's Staff to the Naval Communication's Section in the Naval Command Office.

(4) The Naval Defense Office contains four sections: Naval Defense Section, Diverse Military Affairs Section, Legal Section, and Naval Printing and Official Publication Section.

(5) The General Naval Office provides for the material readiness of the Navy, conducts hydrographic work and maintains contact with the Merchant Marine and with industry in general. It has six sections: Testing Committee, Docks and Yards Section, Hydrographic Office, Merchant Marine Section, Military Economics, and a Statistical Section.

(6) The Naval Armaments Office develops and constructs ordnance of all types. Its sections include: Staff Section, Ordnance Development and Construction, Forts and Harbor Buildings Section, General Ordnance Section, and Group for Underwater Weapons.

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(7) The Naval Administration Office controls pay, provisioning, clothing and housing. Under it are the administrative branches at Kiel and Wilhelmshaven.

(8) The Naval Construction Office designs and supervises the construction of new ships and their propelling machinery. It contains a Naval Architecture Office and a Naval Engineering Section and is staffed by civilians.

c. Operational Branches of the Navy. (1) The Fleet. In the pre-war organization, the Commander-in-Chief of the Fleet reported directly to the Commander-in-Chief of the Navy. The increased scope of the theatres of fleet operations, however, made it desirable to put the direction of these operations in the hands of a newly created commander who would issue, from shore, the communications necessary for widespread sea operations. Therefore, two new high-command positions were created: the Group Commander East, with Headquarters at Kiel, and the Group Commander West, with Headquarters at Wilhelmshaven. After the fall of France, one Group Commander moved his Headquarters to Paris. He is now called Group Commander West. The other Group Commander, with Headquarters probably at Wilhelmshaven, is called Group Commander North. Their task is the conduct of all operations in their area, including the use of such forces afloat, up to the entire fleet, which may be assigned them by the Supreme Command. Until contact has been made with the enemy, the Commander-in-Chief or Task Force Commander carries out the instructions of the Supreme Command relayed through the Group Commander. After contact has been made with an enemy fleet, the Fleet Commander or Task Force Commander has full authority and responsibility.

Prior to the war, the fleet was divided into various commands as follows:

- (a) Commander (Befehlshaber) of Armored Ships (Pocket Battleships);
- (b) Commander (Befehlshaber) of the Scouting Forces, to whom reported Commanders (Fuehrer) of Torpedo Boats, E-boats and Mine-sweepers;
- (c) Commander (Fuehrer) of Submarines.

This was the setup before Germany had completed her two battleships GNEISENAU and SCHARNHORST and her heavy cruisers. Doubtless the addition of these ships has changed the situation with regard to subordinate commands, but the exact status of these commands is not known.

It is probable that a special commander is now assigned for a special task. For example, when the GNEISENAU, SCHARNHORST, and PRINZ EUGEN left Brest in February of this year for their home port, the three units, together with escorting vessels, were under command of Rear Admiral Ciliax, who had been assigned the special mission of bringing them home. Under ordinary circumstances, however, it is probable that major operations employing one or more major units of the fleet are under the command of the Commander-in-Chief of the Fleet. This post is presently occupied by Admiral Schniewind, successor to Admiral Luetjens, who went down with the BISMARCK.

(2) The Submarine Command. The Commander (formerly Fuehrer now

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Befehlshaber) of Submarines (BdU), Admiral Doenitz, occupies an anomalous position in the fleet setup. Apparently he is not under the orders of the Commander-in-Chief of the Fleet or even those of the Commanders North and West, but reports directly to Raeder. In fact he has even been known to bypass Raeder and go directly to Hitler himself. Operational orders for submarines go out directly from Doenitz to the various units.

The submarine command is divided into four groups: (1) Operational; (2) Training; (3) Constructional; (4) Supply.

Submarines are organized in flotillas, each of which includes anywhere from 10 to 30 units. Each flotilla has an administrative head, usually a former submarine commander with the rank of Lieutenant Commander. Several of the present administrative heads were engaged in combat duty the first year of the war but, due to incapacitation, have been assigned to their present jobs.

Before the occupation of France and the Low Countries, submarines were based at German North Sea and Baltic Ports. Now the most important bases are on the French Coast, and most of Germany's operating flotillas move in and out of the concrete shelters at the ports of Lorient, Saint Nazaire, La Pallice, and Brest. Occasionally a flotilla may base at a Norwegian port. There is also one flotilla in the Mediterranean. The Headquarters of the submarine command is in France, probably near Lorient.

Flotillas frequently change their operational bases. An entire flotilla has been known to leave one base in France and move to another.

Germany has a few 1500 ton submarines which operate either as supply ships for the other submarines in the Atlantic, or as mine layers. Construction of more submarines of the same type is in progress.

(3) Commanders of Security of Coastal Waters. Directly responsible to the Group Commanders are the Commanders of Security of Coastal Waters. These officers are entrusted with the patrol and defense of coastal waters in their respective sectors, and have under their command such vessels as minesweepers and other light patrol craft. Before the war there were two commanders responsible for the security of coastal waters: Commander of Security of the North Sea and Commander of Security of the Baltic. There are now, however, three security commanders: Commander of the Security of Coastal Waters West, Commander of Security of Coastal Waters North, and Commander of Security of Coastal Waters East. It is probable that Commander of the Security of Coastal Waters West reports to Group Commander West, and that the other two security officers report to Group Commander North.

The Minesweepers Command (Bdm) is headed by a captain who is reported to have 47 flotillas under his command. Each flotilla consists of 8 vessels. A minesweeper has a Lieutenant in command, one Lieutenant (j.g.) and 45 ratings.

(4) The German Naval Stations. Prior to Germany's vast acquisitions on the continent by force of arms, the German coast line and adjoining sea areas were administered by two naval shore stations: the Naval Stations of the Baltic and the North Sea with headquarters at Kiel and Wilhelmshaven, respectively. These stations were formerly directly under the Commander-in-Chief of the Navy.

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Since the establishment of the Group Commands, Naval Stations, like the Fleet, have been under the Group Commanders North and West, and the number of stations has now increased to five. These include: (a) North Sea; (b) France; (c) Baltic; (d) Norway; (e) Southeast. Each of these stations, with sub-stations as indicated on the attached chart, is administered by a commanding admiral. It is the mission of these stations to defend the coasts, rivers, and off-lying islands, to provide base facilities for forces afloat, to administer coast-wise naval intelligence, to regulate shipping, and to supervise the recruiting and training of enlisted personnel.

Before the war the "Inspectorates," the Navy's training and experimental establishments, commanded by Vice or Rear Admirals, reported to the "security" stations only in disciplinary matters; otherwise they reported directly to Berlin. There has been no indication of a change in this respect. Before the war the Inspectorate of Naval Training at Kiel supervised the Naval Academy at Muerwik, the Petty Officers' Training Establishments at Kiel, Friederichsort and Wesermunde, the Sports School at Muerwik and numerous smaller establishments for vocational training. The Torpedo Inspectorate, also at Kiel, was in charge of experiments with torpedoes, submarines, communications and chemicals. The Sperr or "Blockade" Inspectorate did the same for mining and minesweeping. The Inspectorate of Naval Ordnance had cognizance of experimental and training work in its field. The Inspectorate of Marine Engineering controlled the naval engineering schools at Kiel and Wesermunde, while the Inspectorate of Naval Ammunition Depots controlled numerous depots along the coast. It is known that some of these establishments have been moved to the East for reasons of security since 1939.

The Navy Department is also responsible for the requisition of merchant ships in case of emergency. This is handled by Naval Offices in the larger ports and by specially appointed "Sea Transport Officers" in smaller ports. A Sea Transport Officer is also responsible for troop movements and the transport of military stores. Orders are probably issued by the "Merchant Marine Section" of the General Naval Office.

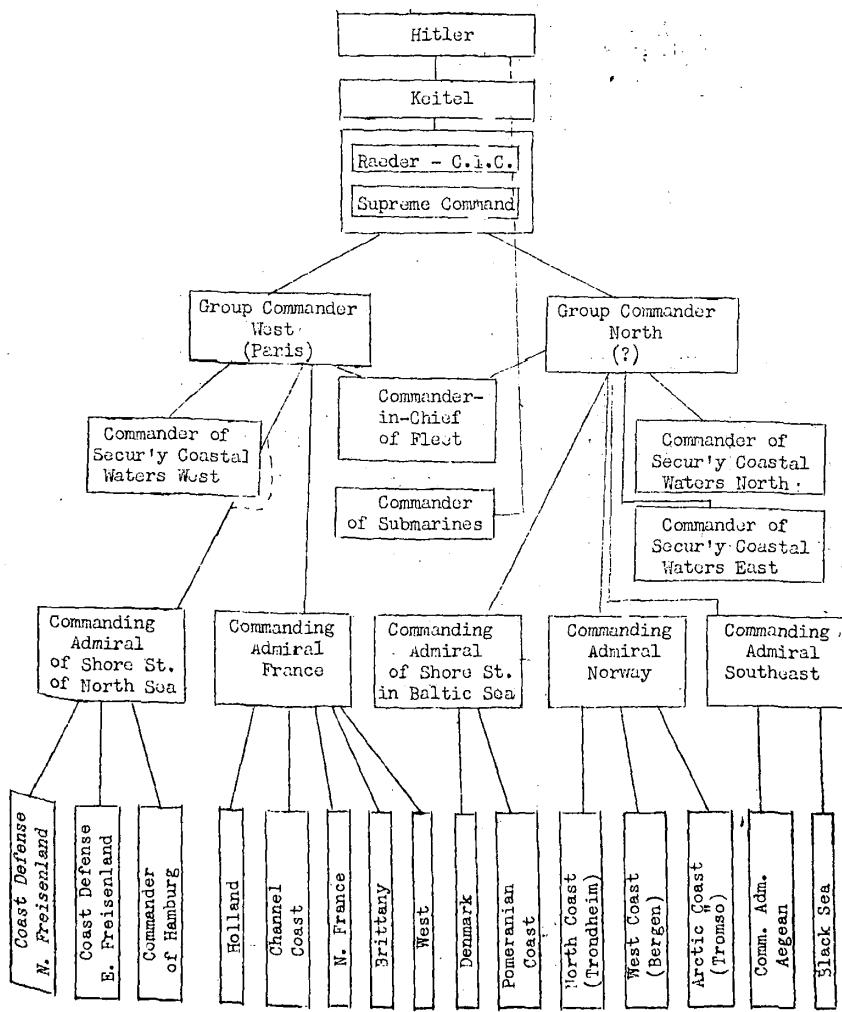
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ORGANIZATION OF GERMAN FLEET AND SHORE STATIONS



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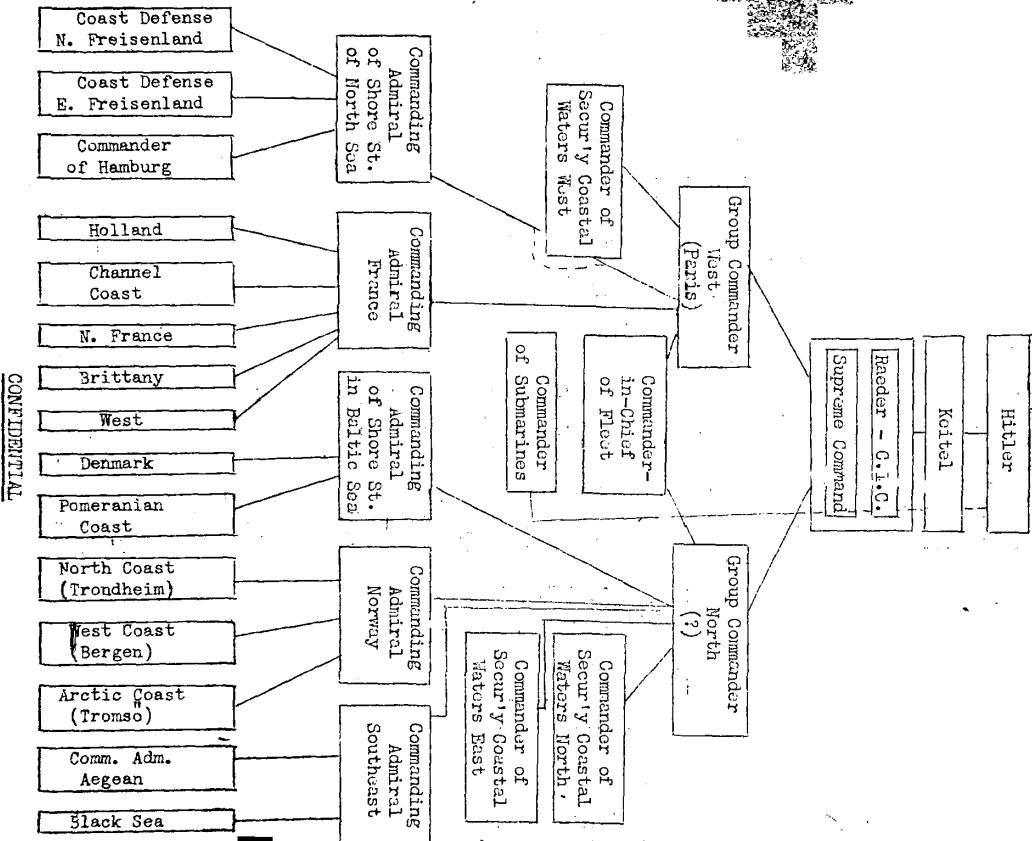
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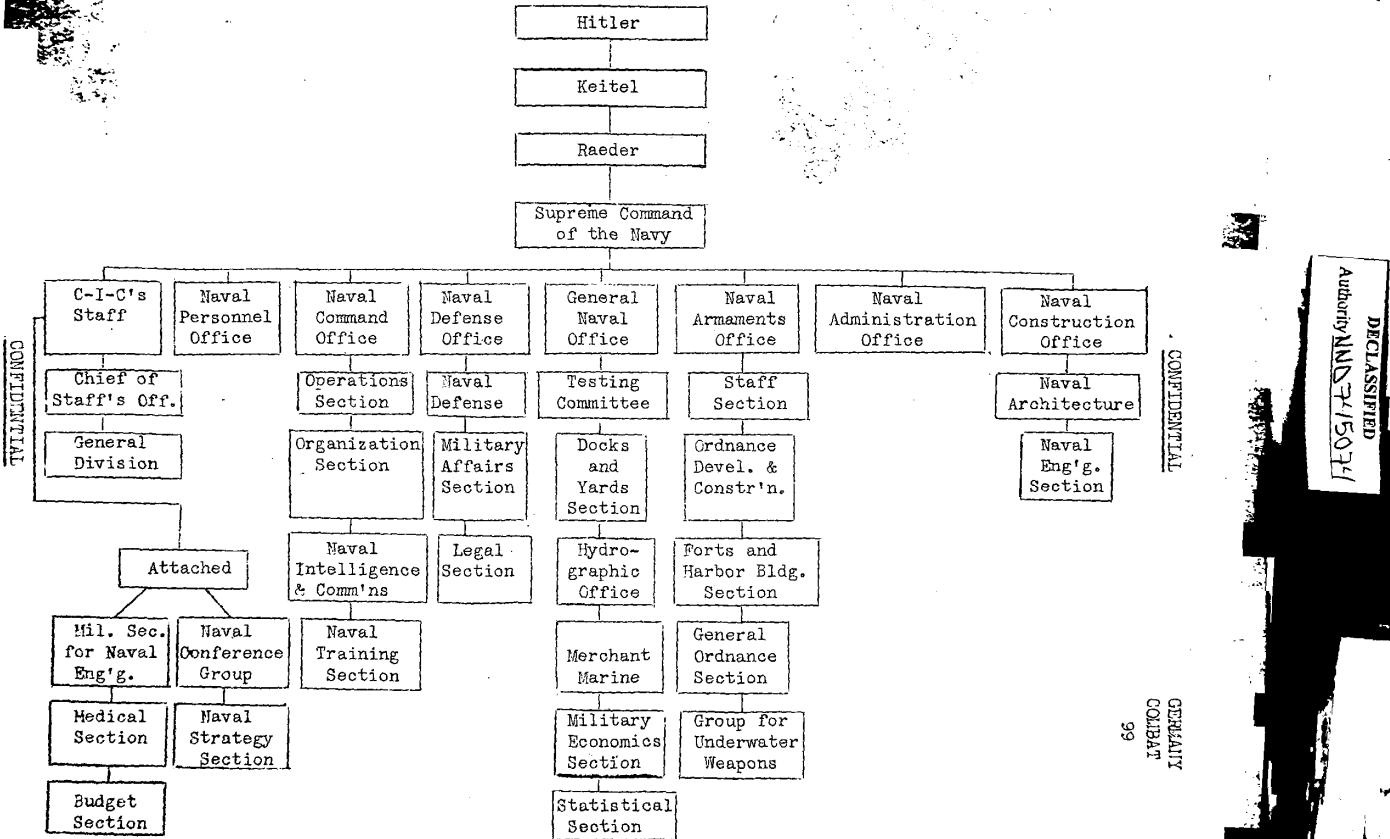
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SUPREME COMMAND OF THE GERMAN NAVY



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d. Rank and Pay.

German Rating or Rank	U.S. Equivalent	Annual Base Pay ("Gehalt")	Monthly War Service Pay ("Wehrsold") (3)	Monthly Pay for Special Service SE ("Wehrsold bei besonder Einsatz")
Matrose			30 M.	30.7 M.
Gefreiter				
Hauptgefreiter	Seaman	1410 M.	36 M.	40.5 M.
Obergefreiter		1410/1800 M.		
Maat (1)	P.O. 3rd C.	1536/2256 M.	42 M.	50.25 M.
Obertoormaat (1)	P.O. 2nd C.	2040/2514 M.	42 M.	56.25 M.
Feldwebel (2)	P.O. 1st C.	2394/2646 M.	54 M.	67.5 M.
Oberfeldwebel (2)	C.P.O.	2400/2838 M.		
Stabsfeldwebel (2)	Warrant Officer	(2,232 M) (4)	60 M.	75 M.
Stabsoberfeldwebel (2)	Chief Warrant Officer	2550/2934 M. (2,376/2,736 M)	67 M. (4)	75 M.
Leutnant zur See	Ensign	2,400/4,200 M.	72 M.	90 M.
Oberleutnant zur See	Lieutenant (jg)	3,400/4,200 M.	81 M.	101.25 M.
Kapitänleutnant	Lieutenant	4,800/6,900 M.	90 M.	120 M.
Korvettenkapitän	Lt. Comdr.	7,700/8,400 M.	No account of	135 M.
Fregattenkapitän	Commander	9,700 M.	" " "	150 M.
Kapitän zur See	Captain	12,600 M.	" " "	189 M.
Konteradmiral	Rear Admiral	16,000 M.	" " "	225 M.
Vizeadmiral	Vice Admiral	19,000 M.	" " "	262.5 M.
Admiral	Admiral	24,000 M.	" " "	300 M.
Generaladmiral	Comdr-in-Chief of the Fleet	26,500 M.	" " "	375 M.

(1) Untereffiziere ohne Portepée (noncommissioned officers without sword-knot)
 (2) Untereffiziere mit Portepée (noncommissioned officers with sword-knot)
 (3) "Monthly pay for special service S.E." is net in addition to "Monthly pay" in column 4, but in lieu of same.
 (4) A later figure. (N/A Berlin, Nov. 6, '41 #663).

(Sources: Hoche, Deutsches Kriegsrecht Vol. II, DIII, Pages 30ff; Various Official Reports).

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V. **GEOGRAPHIC**

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Germany's geographic position in Europe has been strengthened by the successes of her Wehrmacht or Armed Forces in the Norwegian, French, and Russian Campaigns. On the south, Germany controls the European shores of the Mediterranean, either directly or indirectly from Spain to Turkey; on the west, she has control of the French Coast and influence over Spain. On the north, control of the Lowlands, Denmark, Norway, and the Baltic, plus influence over Sweden and Finland secure Germany's frontiers. On the east, the Russian Campaign has added a vast area of land in which Germany's forces have more than sufficient margin of space to maneuver for defense if it should prove necessary.

Furthermore, Germany's geographic position from a World point of view is very strong. She controls the western rim of the Eurasian Continent and has the capability of moving eastward to meet the westward drive of her ally, Japan. Japan holds the eastern rim of the continent and has moved westward from her center of power toward the German center of power.

VI. CONCLUSIONS

Present day Germany has demonstrated tremendous combat capabilities. The nation has been disciplined under Adolf Hitler and the Nazi Party into a coordinated striking force with the Armed Forces as the focal point of its population, natural resources, machines, aggressive psychology and military tradition. A sequence of successes has brought Germany greater insulation against attack, more industry, more land, more manpower and has emphasized the need for final victory in order to preserve present gains.

The unique coordination of army, air force and navy through the High Command and the superior training and equipment of the Germans have brought unusual military successes with minimum losses.

The capabilities of the Army include: 278 fighting divisions (224 offensive and 54 defensive) (7,500,000 men) of which 30 are armored and 16 motorized, with all well-equipped, trained and supplied. One armored division can be equipped per month.

The capabilities of the air force include some 5,750 combat planes in active service plus 4,050 planes of the depot reserve and of other types, 1,952,000 men, with total production capacity of, roughly, 6,000 planes per month. This production is said to have fallen off in June, 1941 to 3,300 and due to labor and transportation difficulties had reached the level of approximately 2,300 combat planes in August, 1942.

The Navy has approximately 175,000 tons completed and 275,000 tons building. Germany has a battle fleet capable of major action against the dispersed naval forces of her opponents, and has striking forces for cooperative missions, blockade, and raiding purposes. The German Navy has already proved its ability in the Norwegian Campaign and in its raiding activities and submarine blockade.

The Russian Campaign has contributed a broader base of natural resources for combat capabilities.

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